

CONTROL DATA[®]

**FR 103-A / FR 104-A / FR 105-A /
FV146-A**

**MULTIPLE ACCESS CONTROLLER
EQUIPMENT**

**DESCRIPTION
THEORY OF OPERATION
PROGRAMMING
DIAGRAMS
MAINTENANCE
WIRE LISTS
MODULE TABS
CABLE TABS
PARTS DATA**



**CONTROL DATA
CORPORATION**

**HARDWARE REFERENCE/
CUSTOMER ENGINEERING MANUAL**

[illegible]

ii

MANUAL TO EQUIPMENT LEVEL CORRELATION SHEET

This manual reflects the equipment configurations listed below.

EXPLANATION: Locate the equipment type and series number, as shown on the equipment FCO log, in the list below. Immediately to the right of the series number is an FCO number. If that number and all of the numbers underneath it match all of the numbers on the equipment FCO log, then this manual accurately reflects the equipment.

EQUIPMENT TYPE	SERIES	WITH FCOs	COMMENTS
FR103-A	01 02 03	CE1595 36823-E	Released
FR104-A	01 02 03	CE1595 36823-E	Released
FR105-A	01 02 03	CE1595 36823-E	Released
FV146-A	01		Released

LIST OF EFFECTIVE PAGES

New features, as well as changes, deletions, and additions to information in this manual, are indicated by bars in the margins or by a dot near the page number if the entire page is affected. A bar by the page number indicates pagination rather than content has changed.

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(Divider)	C	Back Cover	-						
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2-5	C								
2-6	C								
2-7	C								
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2-9	C								
2-10	C								
2-11	C								
2-12	C								
2-13	C								
2-14	C								
2-15	C								
2-16	C								
2-17	C								
2-18	C								
2-19	C								
2-20	C								
2-21	C								
2-22	C								
2-23	C								
2-24	C								
2-25	C								
2-26	C								
2-27	C								
2-28	C								
2-29/2-30	C								
2-31/2-32	C								
3-1 (Divider)									
3-2									
3-3/3-4									
4-1 (Divider)									
4-2									
4-3									
4-4									
4-5									
4-6									
4-7									
4-8									

PREFACE

The Control Data FR103-A/FR104-A/FR105-A/FV146-A Multiple Access Controller (MAC) enables multiple 6000 Series computers to share common peripheral equipment. Equipment numbers FR103-A, FR104-A, and FR105-A respectively configure the individual MAC to function as a 2 x 1, 3 x 1, or 4 x 1 programmable channel switch. The FV146-A Internal Control Switch option provides channel lockout and enable MC and DS switches on the MAC chassis.

This reference/customer engineering manual contains reference information consisting of general and physical descriptions, and operating and programming information. It contains customer engineering information consisting of functional descriptions, logic diagrams, maintenance information, wire lists, and parts data.

The following Control Data publications provide information useful in installing and maintaining the MAC:

Power Supplies Manual

Cordwood Modules, Volumes 1, 2, and 3

Peripheral Controller Cabinets Manual

6400/6500/6600 Computer Systems Input/Output Specifications

Refer to the current Control Data Literature Catalog for the publication numbers and latest revision status.

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SECTION 1

DESCRIPTION

DESCRIPTION

GENERAL DESCRIPTION

The Control Data Multiple Access Controller (MAC) enables the operation of common peripheral device(s) by up to four 6000 Series data channels. In general, the Multiple Access Controller enables two, three, or four 6000 Series computers to share peripheral(s) on a one-at-a-time basis (Figure 1-1).

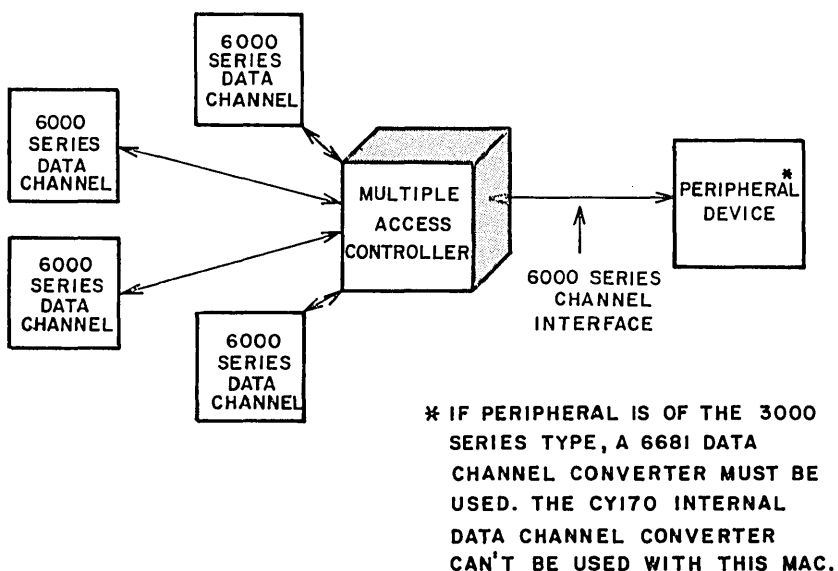


Figure 1-1. Multiple Access Controller/6000 Series Computer System Relationship

PHYSICAL DESCRIPTION

The MAC is contained in a standard 1 x 1 chassis. Thus it may share cabinets with a like number of data channel converters (6681) and utilize the power supply, ventilation system, and temperature monitoring system of the cabinet.

Chassis Specifications

Dimensions

Height	15-7/8 in.
Width	19 in.
Depth	9 in.

Chassis Weight	25 lbs.
Power Requirements	400 cycle, three-phase, 208v, 0.31 amp
Dissipation	93 watts
Cooling Requirements	320 BTU/ hr.

FUNCTIONAL DESCRIPTION

The select and reserve logic within the Multiple Access Controller controls all access to the peripherals attached to the MAC. To operate one of these peripheral devices, the computer must connect the MAC. A computer connects/reserves the MAC via a function code or a 6000 Series computer system Dead Start master clear. However, connecting the MAC by a function code or a master clear is disabled by another computer's prior connect/reserve or by a manual lockout switch. Master Clear Enable switches allow the corresponding channel Master Clear to connect the MAC. Upon receipt of a connect and reserve function code, the MAC returns a status word on the data channel. The status word is returned whether the connect is enabled or disabled.

Once the MAC is connected, operation with its attached peripheral can start. The MAC has no effect on input/output programming other than the 100 nanosecond delay time for data and control signals passing through the MAC.

OPERATION

Operator Controls

Operator controls and indicators which affect the Multiple Access Controller can be located in the MAC cabinet or on a separate channel control device. Switches and indicators that control the individual MAC channels consist of the following:

1. Lockout switch - ON prevents the corresponding computer channel from connecting to the MAC access.
2. Enable MC on DS switch - ON selects the MAC channel that will connect on a Dead Start Master Clear from the corresponding computer.
3. Busy light - ON indicates that the corresponding channel is connected through the MAC access. The Busy light is available only with the external channel control device.

Switch Options

SELF CONTAINED CONTROL SWITCH OPTION

Where no channel control device is used, the MAC control switches are located on two pluggable modules in the MAC logic chassis. Figure 1-2 shows the two optional control switch modules.

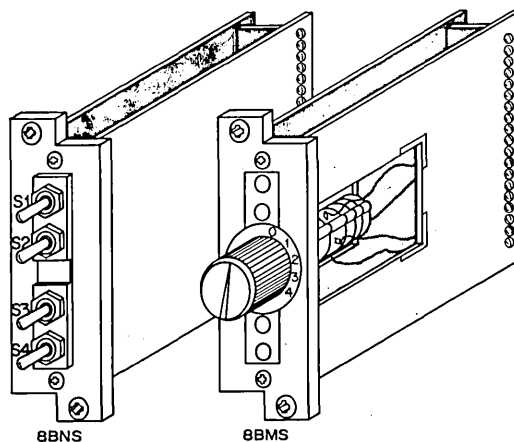


Figure 1-2. Control Switch Modules

EXTERNAL CONTROL SWITCH OPTION

Where the MAC controls are located on an external channel control device, they are described in detail in the reference and CE manuals for the equipment.

PROGRAMMING

The MAC provides two, three, or four 6000 Series computers with shared access to peripheral controllers. Thus, the MAC, via select function codes, is capable of being connected or reserved to one computer at a time. The MAC has no other operations except status which can be programmed. With the MAC connected, it acts as a simple channel extension, and has no effect on input/output programming except for a 100-nsec delay in data and control signals passing through the MAC.

Select Function Codes

The MAC recognizes function codes in which the upper octal digits equal 30. However, if two or more MACs share a common channel, each is wired to recognize a different set of octal digits (such as 31 or 32). Table 1-1 lists the function codes acted on by the MAC.

TABLE 1-1. MULTIPLE ACCESS
CONTROLLER FUNCTION CODES

Octal Code	Description
30X0	Connect and Reserve
30X1	Clear and Connect
30X2 } 30X3 }	Clear Connect and Reserve

CONNECT AND RESERVE (30X0)

This code connects and reserves the MAC, thus providing access to the attached peripheral device. The 30X0 code unconditionally places the MAC in Status mode for the computer, issuing the code. Therefore, to receive valid status, a status input must be performed immediately after a 30X0 function code has been issued.

CLEAR CONNECT (30X1)

This code clears the MAC connection; however, the reserve remains. The other computers are prevented from connecting to the MAC, but the computer which reserved the MAC no longer has access to the peripheral device.

CLEAR CONNECT AND RESERVE (30X2, 30X3)

This code removes the MAC connect and reserve, thus allowing the MAC to be connected to any one of the computers.

Status Word

The MAC status word is made available to a peripheral processor after a connect and reserve (30X0) code has been issued. A one-word input must follow the 30X0 function code to read the status word. Three status bits are available from each access. The status word format from each access is given in Table 1-2.

Programming Considerations

CHANNEL HANG-UP

A channel hang-up condition can occur if the operator disables a channel access while the channel is operating.

TABLE 1-2. MAC STATUS WORD

Access A Status Word	
Bit Position	Description
Bit 11	A Reserved
Bit 10	B, C, or D Reserved
Bit 9	A locked out by channel lockout switch
Bits 8-0	Not Used
Access B Status Word	
Bit Position	Description
Bit 11	B Reserved
Bit 10	A, C, or D Reserved
Bit 9	B locked out by channel lockout switch
Bits 8-0	Not Used
Access C Status Word	
Bit Position	Description
Bit 11	C Reserved
Bit 10	A, B, or D Reserved
Bit 9	C locked out by channel lockout switch
Bits 8-0	Not Used
Access D Status Word	
Bit Position	Description
Bit 11	D Reserved
Bit 10	A, B, or C Reserved
Bit 9	D locked out by channel lockout switch
Bits 8-0	Not Used

PRIORITY

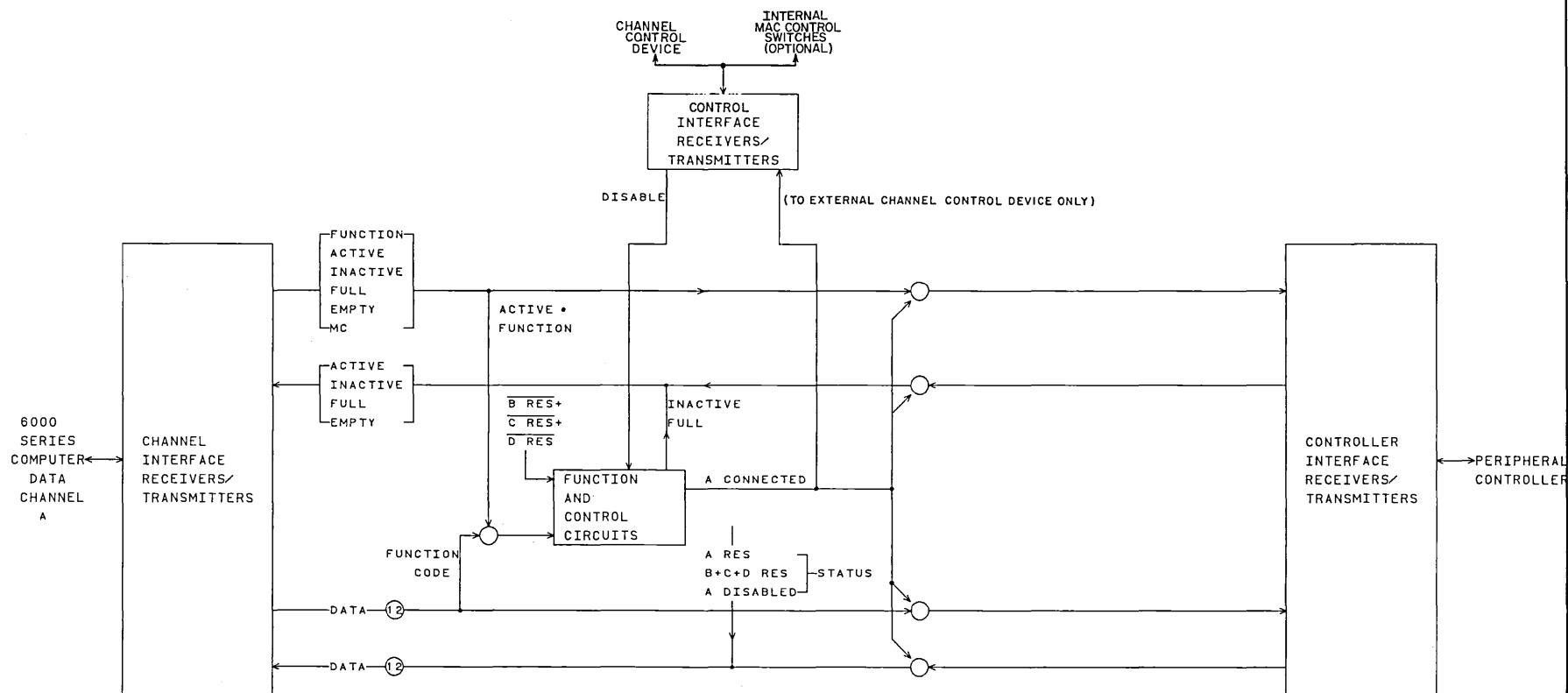
If two or more computers attempt to connect the MAC at the same time, computer A has first priority, computer B has second priority, computer C has third priority, and computer D has fourth priority.

ZERO STATUS WORD

Under certain conditions an all-zero status word can be read from the MAC. These

conditions exist when the MAC is reserved by a computer and another computer attempts to connect the MAC. The second computer cannot connect to the previously reserved MAC. The status word read by this computer will have status bit 10 set (reserved by another computer). However, if the first computer releases its access before the second computer can read status, the status word read by the second computer may contain all zeros.

SECTION 2
EQUIPMENT DIAGRAMS



NOTE:
ACCESS B, C, AND D ARE SIMILAR.

CONTROL DATA		TITLE		PRODUCT	
		MULTIPLE ACCESS CONTROLLER		MAC	
		BLOCK DIAGRAM (ACCESS A)		SIZE	REV
				C	
				TAPE	SHEET
				6988	13
				PAGE	
				2-5	

FUNCTION TRANSLATIONS

The function translation circuit decodes the function and equipment select portion of the function select codes received by the access. The translators monitor the data lines and decode bits 0 and 1, and 6 through 11. Table 2-1 contains the function codes recognized by the MAC.

TABLE 2-1. MULTIPLE ACCESS CONTROLLER
FUNCTION SELECT CODES

Octal Function Code	Description
30X0	Connect and Reserve
30X1	Clear Connect
30X2 } 30X3 }	Clear Connect and Reserve

CONNECT FF

The Connect FF, when set, enables the transfer of data and control signals between the data channel and the peripheral controller. The Connect FF sets, upon receipt of a 30X0 function code, if the MAC is not already reserved by another access or if the access is not disabled by the channel lockout switch. The Connect FF clears, upon receipt of a 30X1, a 30X2 or a 30X3 function code or if the access is disabled by the channel lockout switch.

RESERVE FF

The Reserve FF, when set, disables the function translator circuits of the other accesses, and provides reserved status for access A. The Reserve FF is set when the Connect FF sets, and clears upon receipt of a 30X2 or a 30X3 function code or when the access is disabled by the MSC or by the optional internal switches.

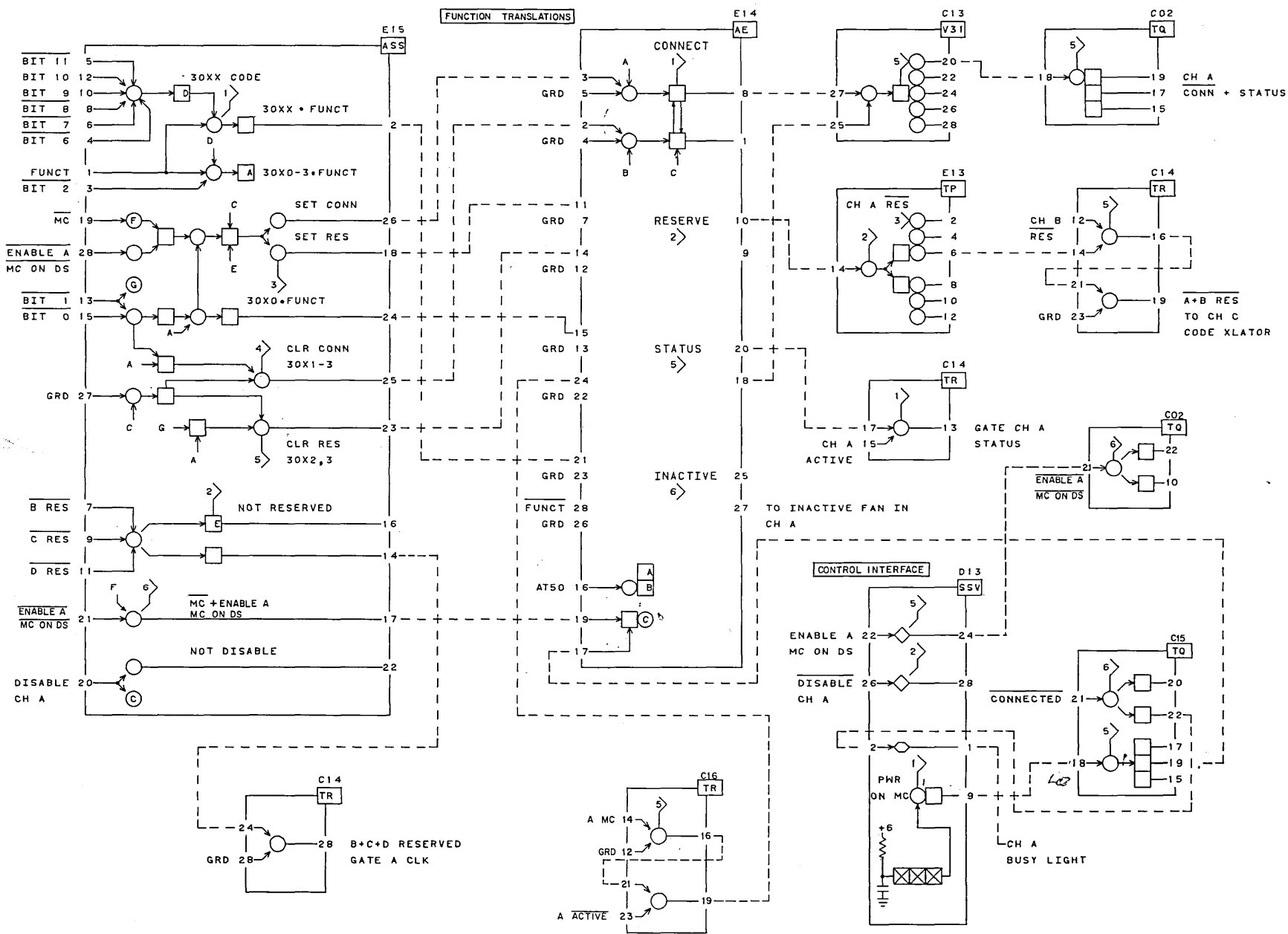
STATUS FF

The Status FF, when set, enables the gating of access A status word to the data channel. The Status FF sets upon receipt of a 30X0 function code and clears upon receipt of an Active signal or Master Clear signal from the data channel. Note that the status word is transferred to the data channel, upon receipt of an active signal with the status FF set.

CHANNEL CONTROL INTERFACE

These circuits are an interface between the external channel control device or optional internal switches and the MAC access. The Enable A MC on DS, when active, automatically connects access A to computer A during a Dead Start operation, if an access is not already connected. The Not Disable Ch A prevents access A from connecting to computer A. This interface also returns an access A connected (BUSY) condition. Pages 2-28 and 2-29 detail the Control Switch interface. The BUSY light is only used with an external channel control device.

TERM	LOC'N	PAGE	TERM	LOC'N	PAGE	TERM	LOC'N	PAGE
$\overline{B}$ Res	E13	2-7	Data Bits (0-1)	E03	2-21	Funct	E12	2-15
$\overline{C}$ Res	D13	2-9	Data Bits (6-11)	E04, E05	2-19	$\overline{MC}$	E12	2-15
Ch A Active	E06	2-15	$\overline{D}$ Res	A13	2-11	AT50	E02	2-13



CONTROL DATA	TITLE		PRODUCT	
	MULTIPLE ACCESS CONTROLLER		MAC	
	FUNCTION AND CONTROL		SIZE DWG. NO.	REV
	CIRCUITS		C	
CHANNEL A		TAPE	SHEET	PAGE
		6924	1	2-7

ACCESS B FUNCTION AND CONTROL CIRCUITS

The access B function and control circuits are similar to the access A function and control circuits.

TERM	LOC'N	PAGE	TERM	LOC'N	PAGE	TERM	LOC'N	PAGE
<u>A Res</u>	E13	2-5	Data Bits (0, 1)	D03	2-21	<u>Funct</u>	D12	2-15
<u>C Res</u>	D13	2-9	Data Bits (6-11)	D04, D05	2-19	<u>MC</u>	D12	2-15
Ch B Active	D06	2-15	<u>D Res</u>	A13	2-11	BT50	D02	2-13

ACCESS C FUNCTION AND CONTROL CIRCUITS

The access C function and control circuits are similar to the access A function and control circuits.

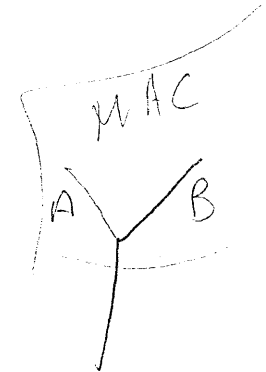
TERM	LOC'N	PAGE
<u>A Res</u>	E13	2-5
<u>B Res</u>	E13	2-7
Ch C Active	B06	2-15

TERM	LOC'N	PAGE
Data Bits (0, 1)	B03	2-21
Data Bits (6-11)	B04, B05	2-19
<u>D Res</u>	A13	2-11

TERM	LOC'N	PAGE
Func ^t	E12	2-15
<u>MC</u>	D12	2-15
CT50	B02	2-13

CHANNEL → PERIPHERAL INTERFACE (CONTROL LINES)

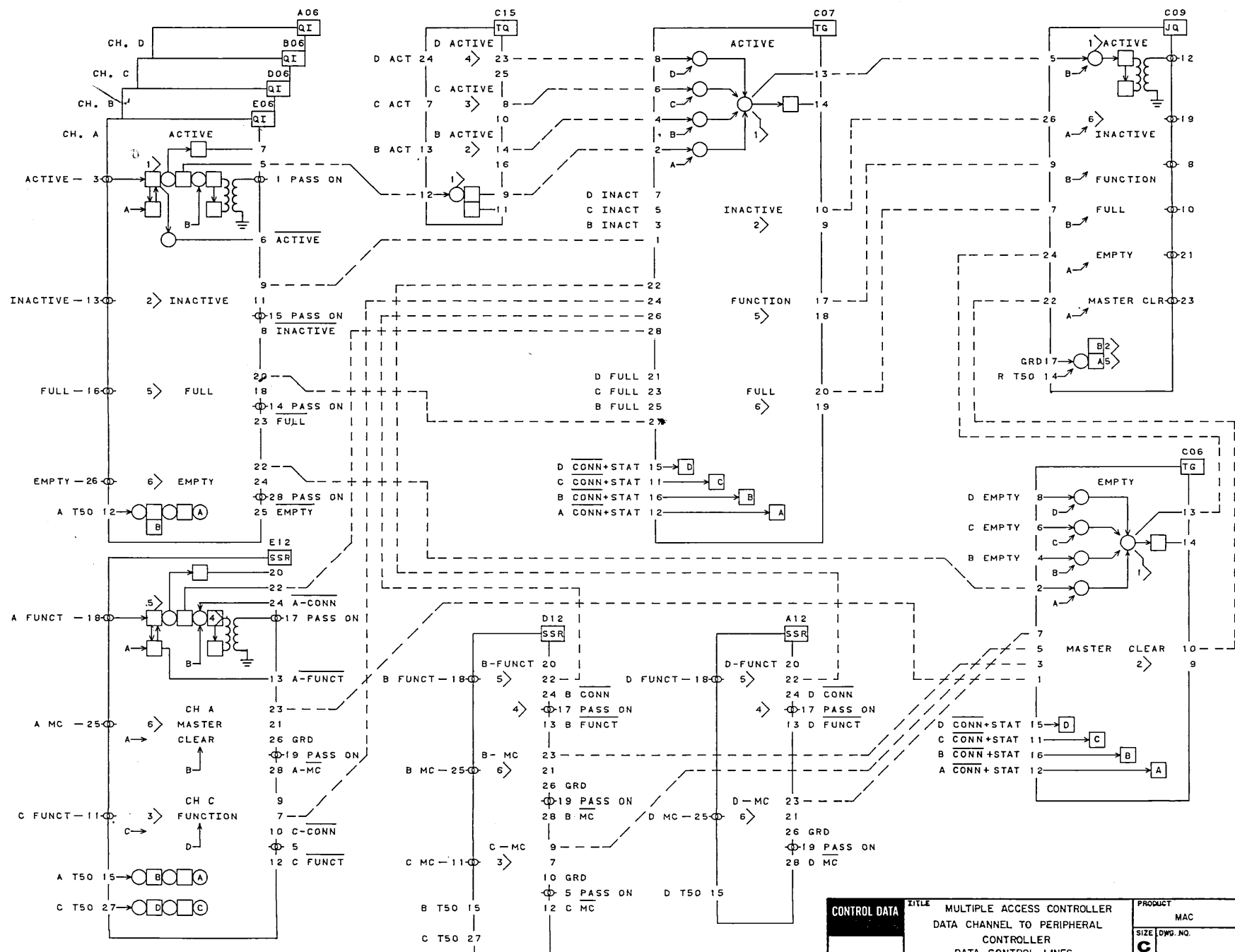
The channel control line interface terminates each of the data channel control lines. The control lines transfer standard 6000 Series control signals which are completely defined in the 6000 Series I/O Specifications Manual (see Control Data Literature Distribution Center Catalog for publication number). With an access connected, the control signals received from the data channel are gated through these circuits to the peripheral device controller. There is a 100 nsec transfer delay through these circuits.



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E80

TERM	LOC'N	PAGE
AT50	E02	2-13
A Conn + Stat	C13	2-5
BT50	D02	2-13
B Conn + Stat	D01	2-7
CT50	B02	2-13
C Conn + Stat	B01	2-9
DT50	A02	2-13
D Conn + Stat	A01	2-11



PERIPHERAL → CHANNEL INTERFACE (CONTROL LINES)

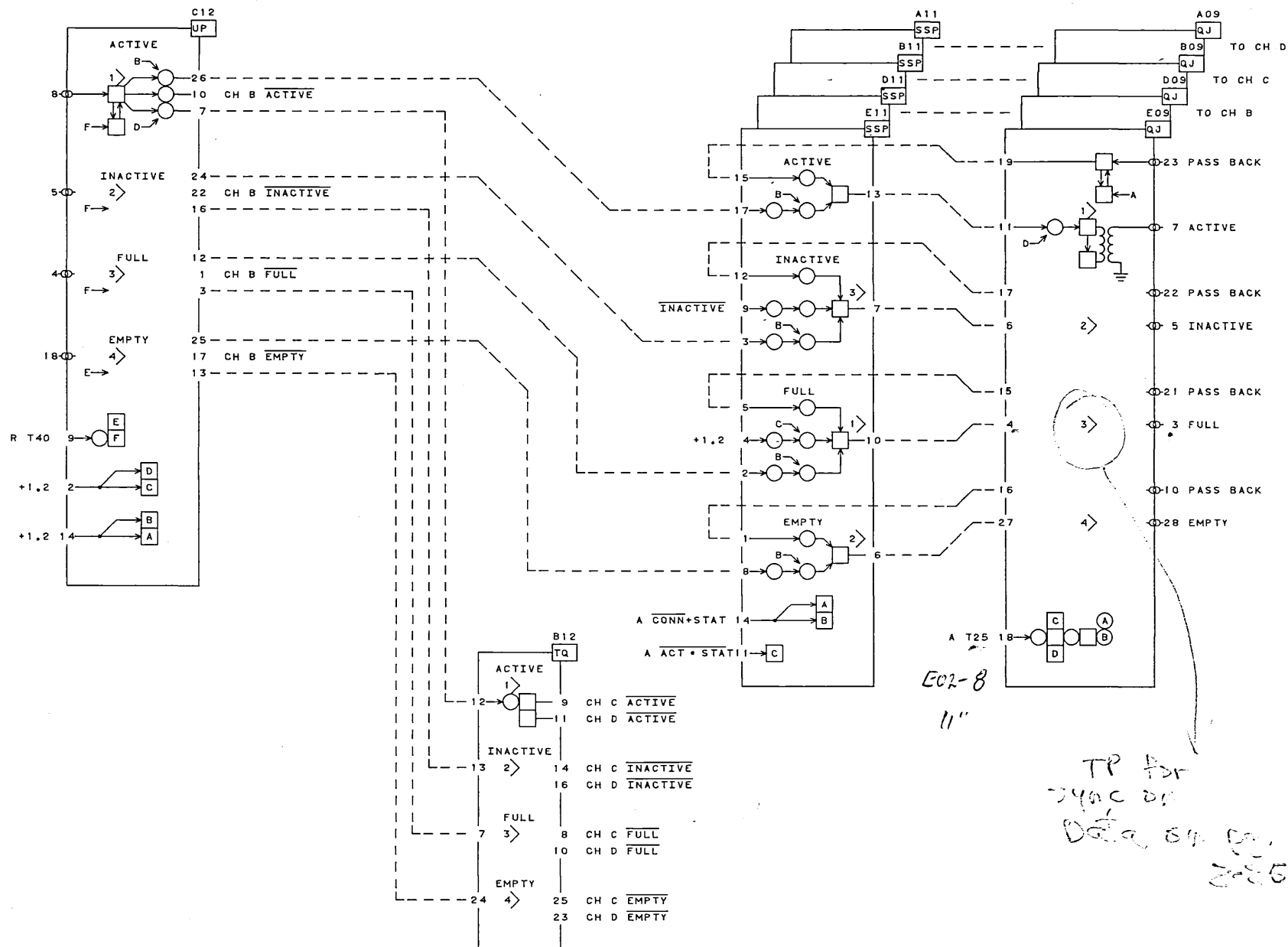
The peripheral control line interface terminates the control signals received from the peripheral controller. With an access connected, the control signals received from the peripheral device controller are gated through these circuits to the data channel. These circuits also provide a 100 nsec delay.

TERM	LOC'N	PAGE
A Act • Stat	C14	2-5
A Conn + Stat	C13	2-5
AT25	E02	2-13
B Act • Stat	C14	2-7
B Conn + Stat	C13	2-7

TERM	LOC'N	PAGE
BT25	D02	2-13
C Act • Stat	C14	2-9
C Conn + Stat	C13	2-9
CT25	B02	2-13

TERM	LOC'N	PAGE
D Act • Stat	C14	2-11
D Conn + Stat	C13	2-11
DT25	A02	2-13
RT40	D01	2-13

FROM PERIPHERAL CONTROLLER



CONTROL DATA	TITLE MULTIPLE ACCESS CONTROLLER PERIPHERAL CONTROLLER TO DATA CHANNEL DATA CONTROL LINES	PRODUCT MAC	
		SIZE DWG. NO. C	REV
TAPE 6930	SHEET 7	PAGE 2-19	

CHANNEL → PERIPHERAL INTERFACE (DATA LINES)

The channel data line interface terminates the data lines from the data channel. These data lines are standard 6000 Series communication lines and are completely defined in the 6000 Series I/O Specifications Manual. The data lines are gated from the data channel to the peripheral controller when an access is connected.

TERM	LOC'N	PAGE
A Conn + Stat	C02, C13	2-5
AT50	E02	2-13
B Conn + Stat	D01	2-7

TERM	LOC'N	PAGE
BT50	D02	2-13
C Conn + Stat	B01	2-9
CT50	B02	2-13

TERM	LOC'N	PAGE
D Conn + Stat	A01	2-11
DT50	A02	2-13
RT50	E01	2-13

BLOCK DIAGRAM DESCRIPTION

Page 2-5 is a functional block diagram of the MAC. The block diagram illustrates the major MAC circuits and the control signals connecting them.

FUNCTION AND CONTROL CIRCUITS

Any one of the 6000 Series computers may communicate with the peripheral device(s) attached to the MAC. The computer issuing a Connect and Reserve function code recognized by the MAC (30X0) establishes communication. The appropriate MAC access senses the function code and attempts to set the Connect and Reserve flip-flops for that computer. The Connect and Reserve flip-flops set if neither of the other accesses are reserved, and if the computer attempting to connect is not locked out by the external channel control device or the optional internal MAC control switches.

With the Connect and Reserve flip-flops set, the necessary enables are provided to transfer the data and control signals of the connected computer data channel through the MAC to/from the peripheral device. The MAC provides a 100 nsec transfer delay in the transfer path between a computer and a peripheral device.

MODULE LOCATION INDEX

CHASSIS

ROW A	MODULE	PAGE
01	TH	2-13, 2-15
02	HQ	2-15
03	QI	2-23
04	QI	2-21, 2-23
05	QI	2-21
06	QI	2-17
07	QJ	2-27
08	QJ	2-25
09	QJ	2-15, 2-19
10	SSN	2-25, 2-27
11	SSP	2-19, 2-25
12	SSR	2-17
13	SSV	2-13, 2-29
14	AE	2-13
15	8ASS	2-13
16		
17		
18		
19		
20		

ROW B	MODULE	PAGE
01	TH	2-11, 2-15
02	HQ	2-15
03	QI	2-23
04	QI	2-21, 2-23
05	QI	2-21
06	QI	2-17
07	QJ	2-27
08	QJ	2-25
09	QJ	2-15, 2-19
10	SSN	2-25, 2-27
11	SSP	2-19, 2-25
12	TQ	2-19, 2-25
13	TQ	2-25, 2-27
14	AE	2-11
15	8ASS	2-11
16		
17		
18		
19		
20		

ROW C	MODULE	PAGE
01	TG	2-15
02	TQ	2-7, 2-11, 2-13, 2-15
03	TG	2-23
04	TG	2-23
05	TG	2-21
06	TG	2-17, 2-21
07	TG	2-17
08	JQ	2-21, 2-23
09	JQ	2-17, 2-21
10	UP	2-27
11	UP	2-25
12	UP	2-19
13	V31	2-7, 2-9, 2-11, 2-13
14	TR	2-7, 2-9, 2-11, 2-13
15	TQ	2-7, 2-9, 2-11, 2-13, 2-17
16	TR	2-7, 2-9, 2-11, 2-13
17		
18		
19		
20		

ROW D	MODULE	PAGE
01	TH	2-9, 2-15
02	HQ	2-15
03	QI	2-23
04	QI	2-21, 2-23
05	QI	2-21
06	QI	2-17
07	QJ	2-27
08	QJ	2-25
09	QJ	2-15, 2-19
10	SSN	2-25, 2-27
11	SSP	2-19, 2-25
12	SSR	2-15, 2-17
13	SSV	2-7, 2-9, 2-11, 2-29
14	AE	2-9
15	8ASS	2-9, 2-13
16	8BNS*	2-29
17		
18		
19		
20		

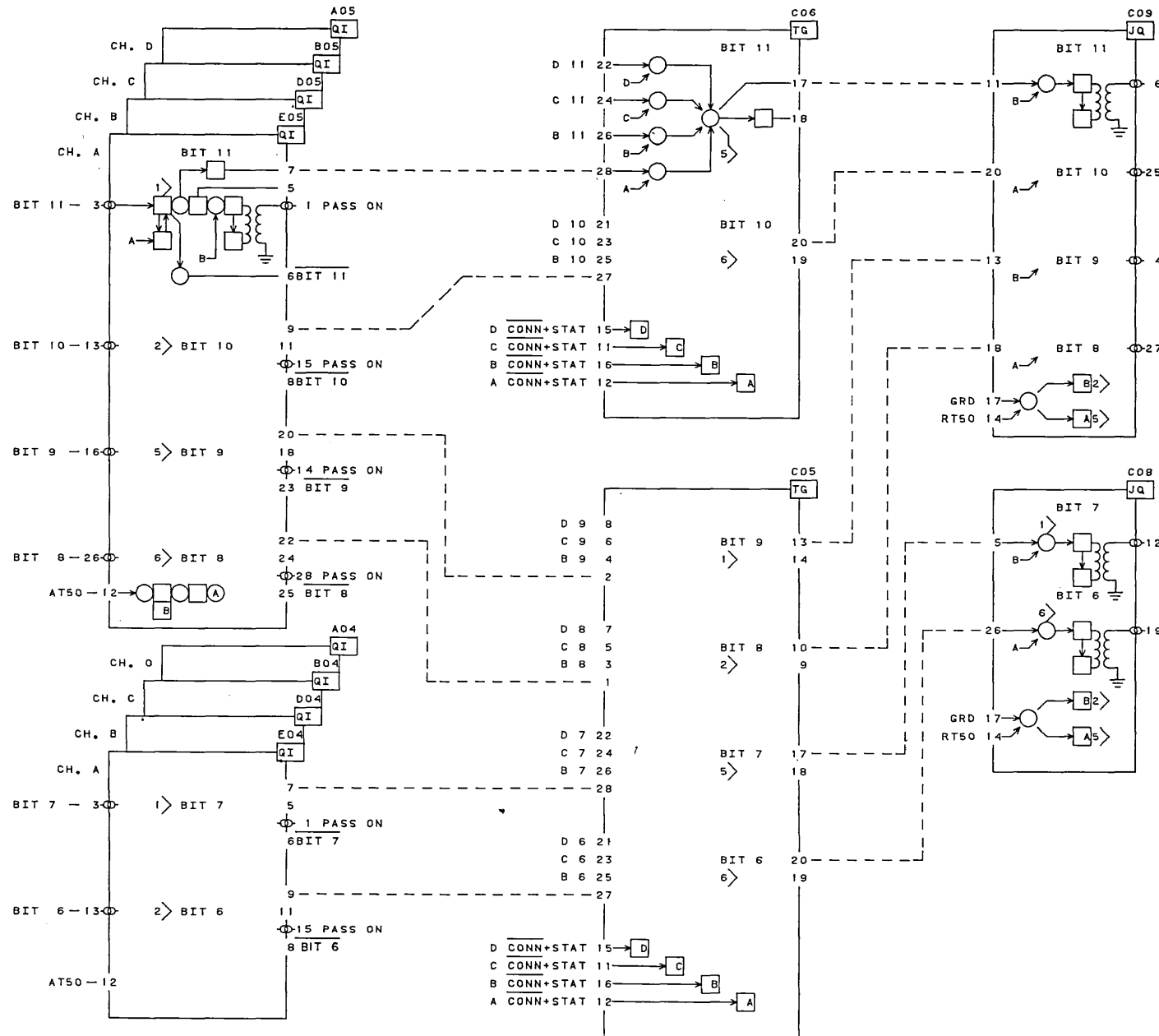
ROW E	MODULE	PAGE
01	TH	2-15
02	HQ	2-15
03	QI	2-23
04	QI	2-21, 2-23
05	QI	2-21
06	QI	2-17
07	QJ	2-27
08	QJ	2-25
09	QJ	2-15, 2-19
10	SSN	2-25, 2-27
11	SSP	2-19, 2-25
12	SSR	2-15
13	TP	2-7, 2-9
14	AE	2-7
15	8ASS	2-7
16	8BMS*	2-29
17		
18		
19		
20		

*These modules used with internal control switch option only.

NOTE: The module location index is shown for a 4 x 1 MAC.

For a 3 x 1 MAC, Row A will be empty.

For a 2 x 1 MAC, Rows A and B will be empty.



TO PERIPHERAL CONTROLLER

CONTROL DATA		TITLE		PRODUCT	
		MULTIPLE ACCESS CONTROLLER DATA CHANNEL TO PERIPHERAL CONTROLLER DATA-BITS 6-11		MAC	
				SIZE DWG. NO.	REV
				C	
TAPE	931	SHEET	8	PAGE	2-21

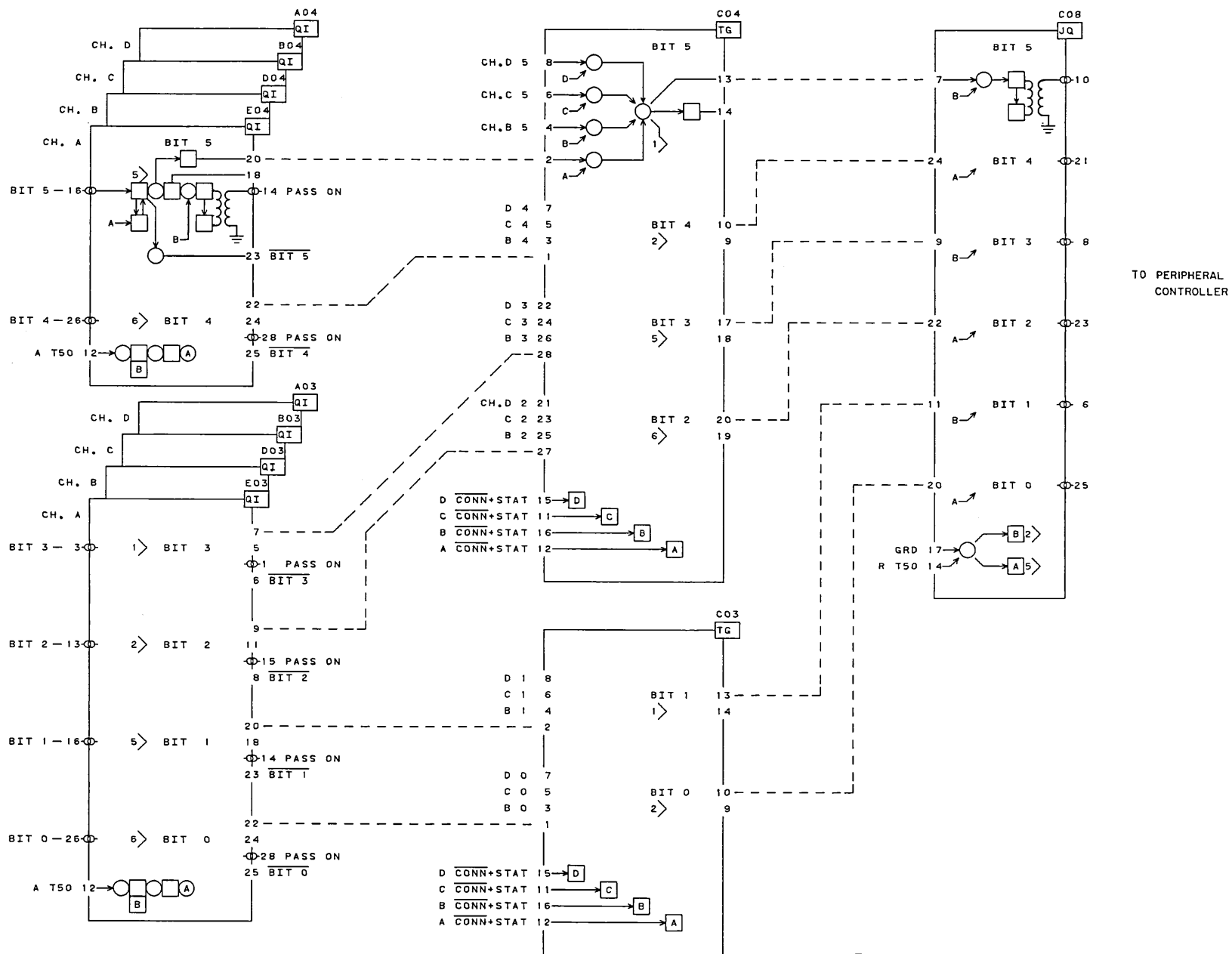
CHANNEL PERIPHERAL INTERFACE (DATA LINES)

These circuits are similar to those described on page 2-20, but are for data bits 0-5.

TERM	LOC'N	PAGE
A $\overline{\text{Conn}}$ + Stat	C02	2-5
AT50	E02	2-13
B $\overline{\text{Conn}}$ + Stat	D01	2-7

TERM	LOC'N	PAGE
BT50	D02	2-13
C $\overline{\text{Conn}}$ + Stat	C13, B01	2-9
CT50	B02	2-13

TERM	LOC'N	PAGE
D $\overline{\text{Conn}}$ + Stat	A01	2-11
DT50	A02	2-13
RT50	E01	2-13



CONTROL DATA	TITLE		PRODUCT	
	MULTIPLE ACCESS CONTROLLER		MAC	
	DATA CHANNEL TO PERIPHERAL CONTROLLER		SIZE DWG. NO.	
	DATA BITS 0-5		REV	
		TAPE		PAGE
		932		2-23

PERIPHERAL → CHANNEL INTERFACE (DATA LINES)

The peripheral data line interface terminates the data lines received from the peripheral device controller. With an access connected, the data lines are transferred directly from the peripheral device controller to the data channel.

STATUS

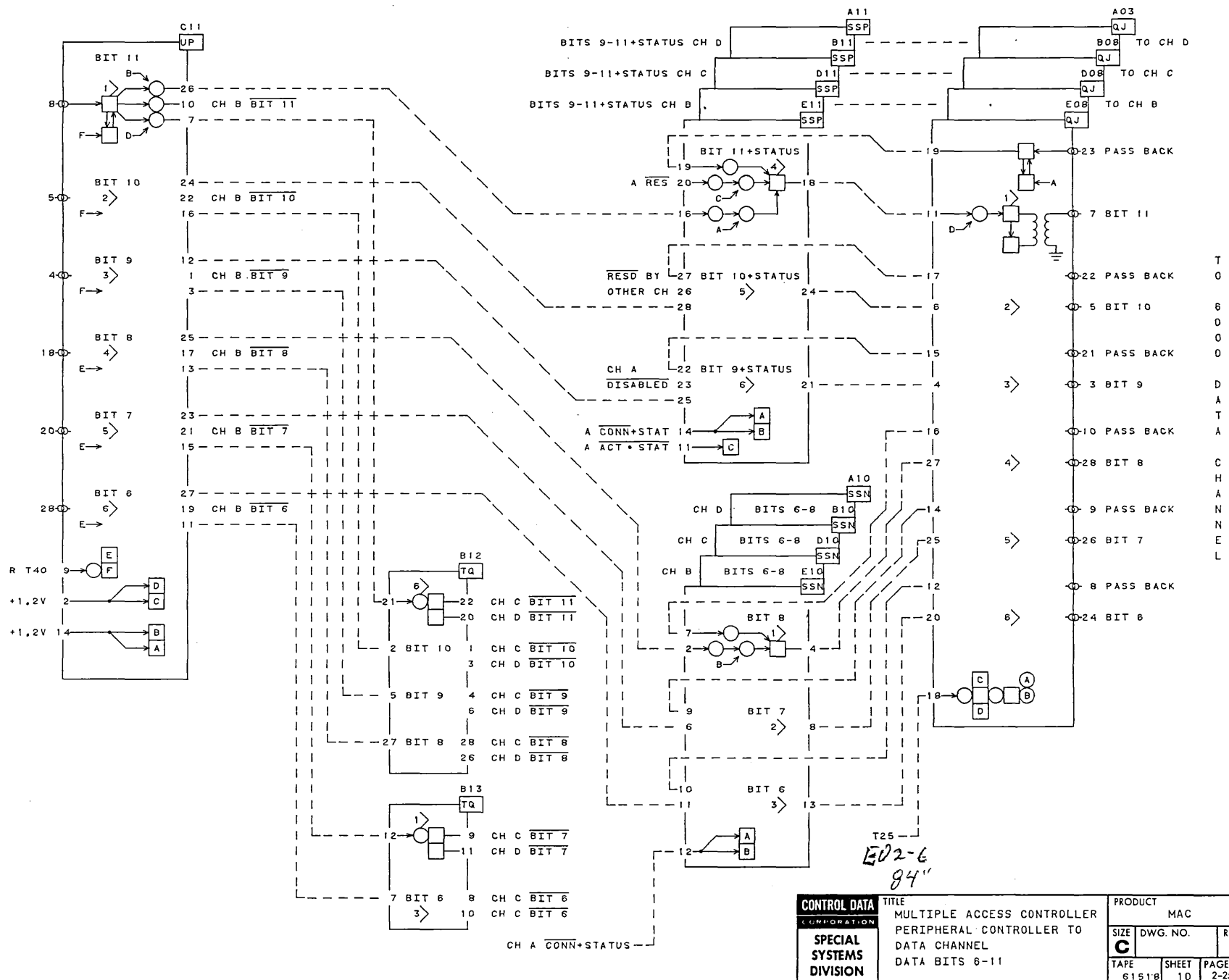
The peripheral data line interface also transfers the MAC status word to the data channel. Table 2-2 contains the MAC status word bit assignments.

TABLE 2-2. MAC STATUS WORD

Access A Status Word		Access C Status Word	
Bit Position	Description	Bit Position	Description
Bit 11	A Reserved	Bit 11	C Reserved
Bit 10	B, C, or D Reserved	Bit 10	A, B, or D Reserved
Bit 9	A locked out by lockout switch	Bit 9	C locked out by lockout switch
Bits 8-0	Not Used	Bits 8-0	Not Used
Access B Status Word		Access D Status Word	
Bit Position	Description	Bit Position	Description
Bit 11	B Reserved	Bit 11	D Reserved
Bit 10	A, C, or D Reserved	Bit 10	A, B, or C Reserved
Bit 9	B locked out by lockout switch	Bit 9	D locked out by lockout switch
Bits 8-0	Not Used	Bits 8-0	Not Used

TERM	LOC'N	PAGE	TERM	LOC'N	PAGE	TERM	LOC'N	PAGE
A <u>Act</u> • Stat	C14	2-5	BT25	D02	2-13	D <u>Act</u> • Stat	C14	2-11
A <u>Conn</u> + Stat	C13	2-5	C <u>Act</u> • Stat	C14	2-9	D <u>Conn</u> + Stat	C13	2-11
AT25	E02	2-13	C <u>Conn</u> + Stat	C13	2-9	DT25	A02	2-13
B <u>Act</u> • Stat	C14	2-7	CT25	B02	2-13	RT40	D01	2-13
B <u>Conn</u> + Stat	C13	2-7						

FROM PERIPHERAL CONTROLLER



CONTROL DATA CORPORATION SPECIAL SYSTEMS DIVISION	TITLE	PRODUCT		
	MULTIPLE ACCESS CONTROLLER	MAC		
	PERIPHERAL CONTROLLER TO	SIZE	DWG. NO.	REV.
	DATA CHANNEL	C		
	DATA BITS 6-11	TAPE	SHEET	PAGE
		61518	10	2-25

PERIPHERAL → CHANNEL INTERFACE (DATA LINES)

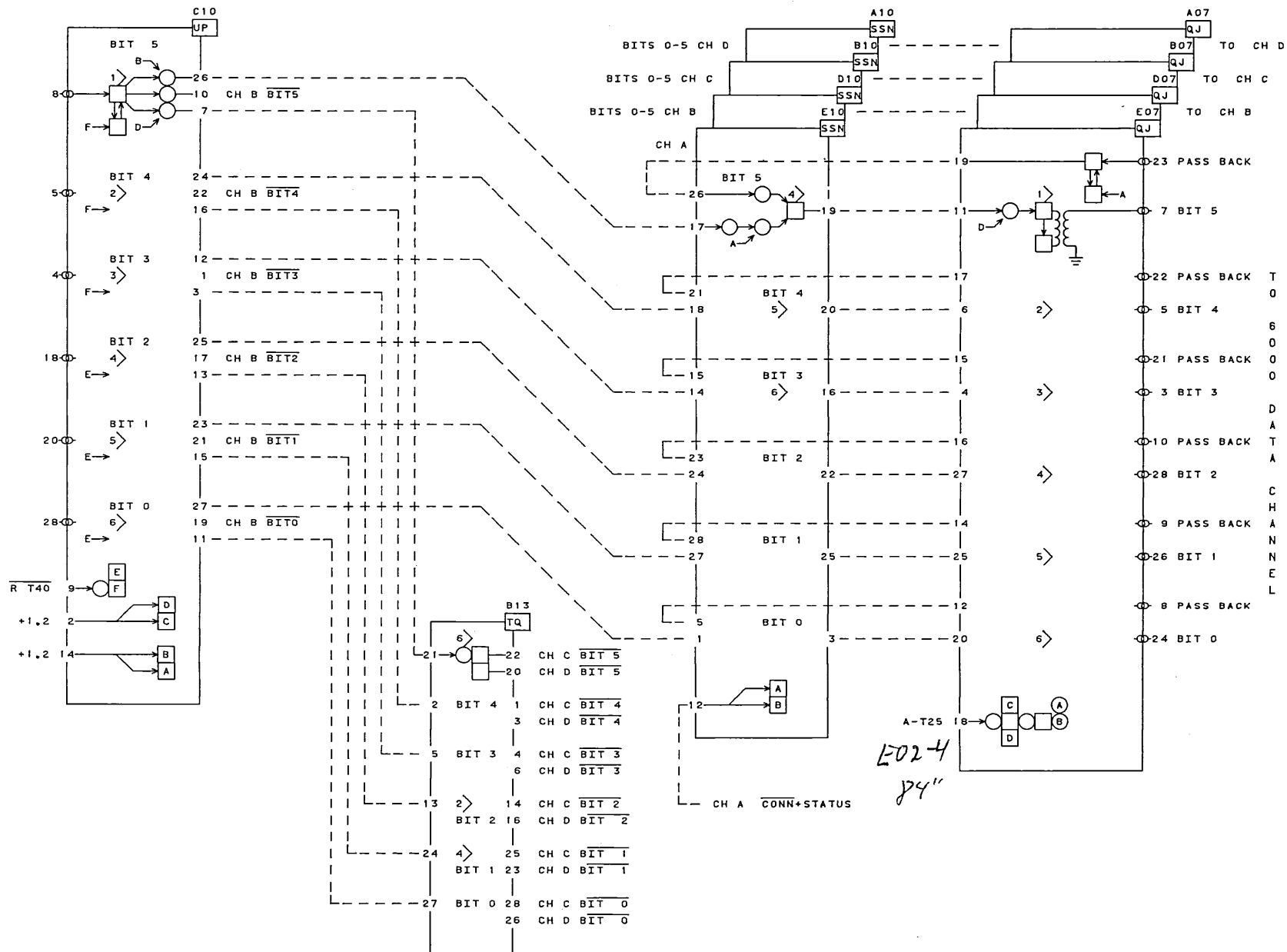
These circuits are similar to those described on page 2-24, but are for data bits 0 - 5.

TERM	LOC'N	PAGE
A $\overline{\text{Conn}}$ + Status	C13	2-5
AT25	E02	2-13
B $\overline{\text{Conn}}$ + Status	C13	2-7

TERM	LOC'N	PAGE
BT25	D02	2-13
C $\overline{\text{Conn}}$ + Status	C13	2-9
CT25	B02	2-13

TERM	LOC'N	PAGE
D $\overline{\text{Conn}}$ + Status	C13	2-11
DT25	E02	2-13
$\overline{\text{RT40}}$	D01	2-13

FROM PERIPHERAL CONTROLLER



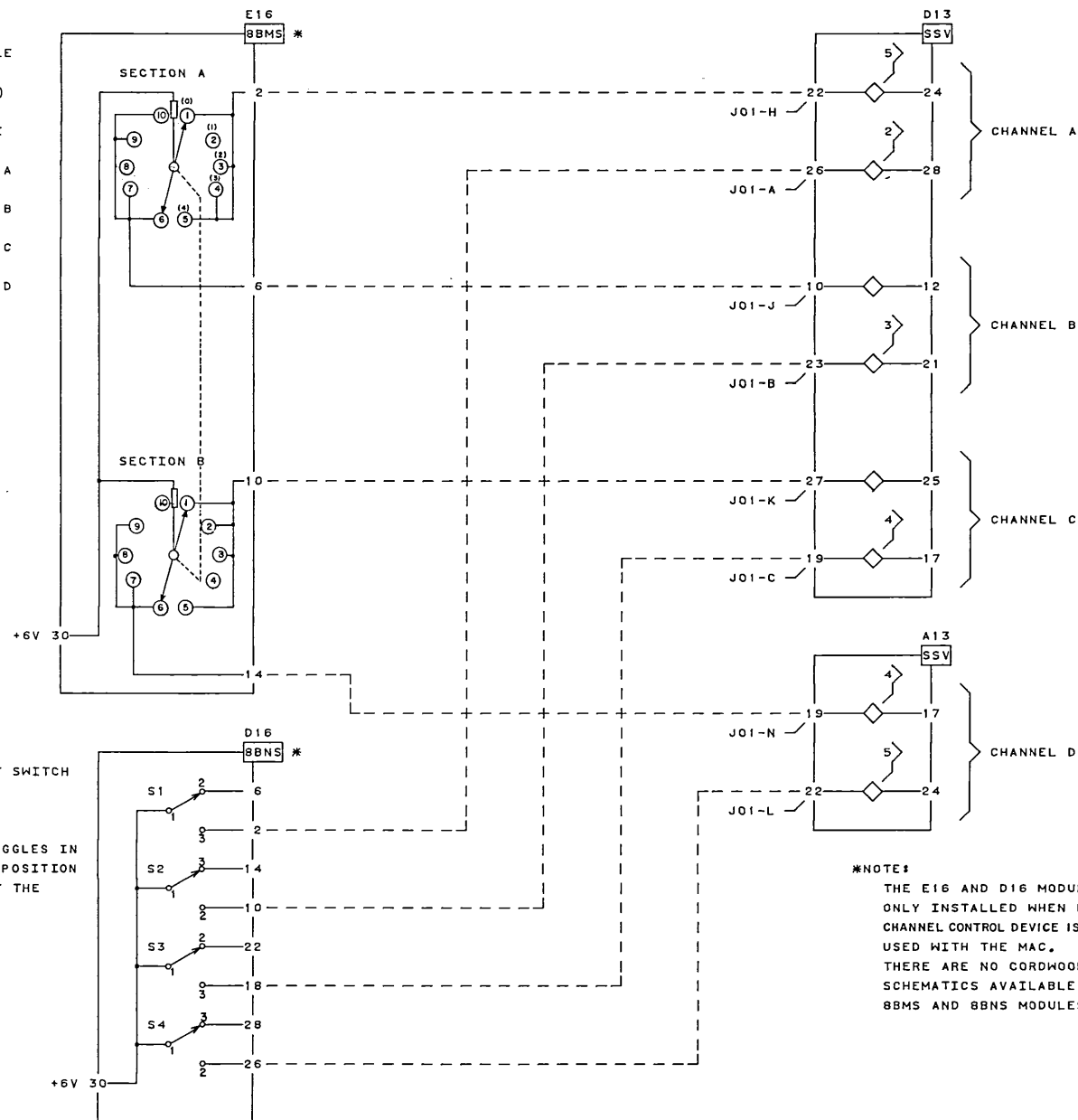
CONTROL DATA	TITLE	PRODUCT		
	MULTIPLE ACCESS CONTROLLER PERIPHERAL CONTROLLER TO DATA CHANNEL DATA BITS 0-5	MAC		
		SIZE	DWG. NO.	REV
		C		
		TAPE	SHEET	PAGE
		934	11	2-27

CONTROL SWITCH MODULES (OPTIONAL)

Special 6000 Series switch modules are installed when an external channel control device is not used. They provide channel lockout and dead start enable selection control. The input pins to D13 and A13 are wired to the switch module pins and to the J01 cable connector. The wiring on D13 and A13 is doubled up by crimping two wires in each taper pin.

DEADSTART ENABLE
SWITCH MODULE
(POSITION "0" SHOWN)

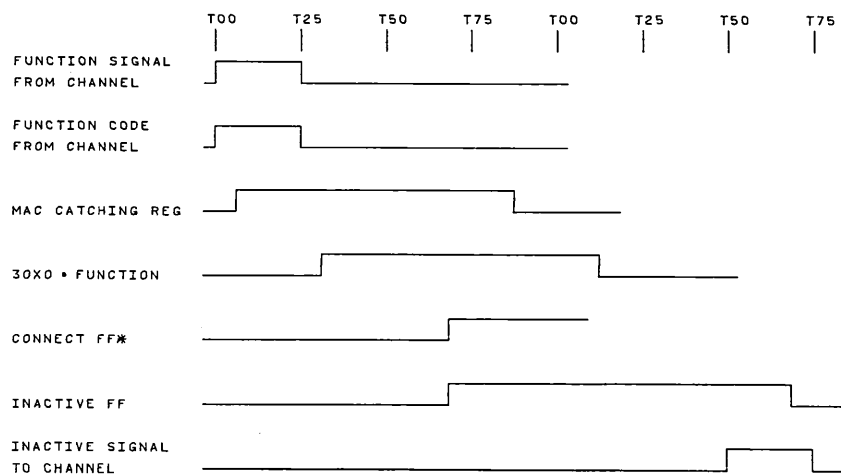
POSITION 0 = DISABLE
POSITION 1 = ENABLE A
POSITION 2 = ENABLE B
POSITION 3 = ENABLE C
POSITION 4 = ENABLE D



*NOTE:
THE E16 AND D16 MODULES ARE ONLY INSTALLED WHEN NO EXTERNAL CHANNEL CONTROL DEVICE IS USED WITH THE MAC. THERE ARE NO CORDWOOD MODULE SCHEMATICS AVAILABLE FOR THE 8BMS AND 8BNS MODULES.

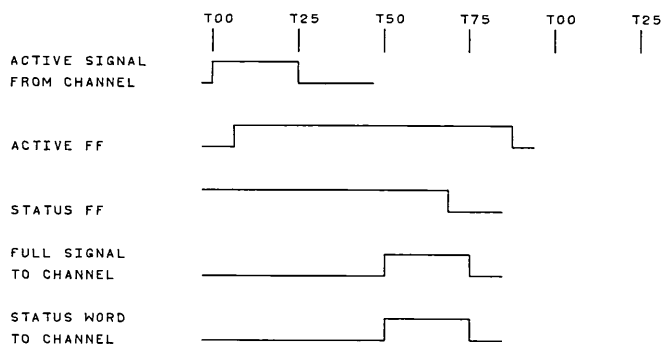
CONTROL DATA		TITLE		PRODUCT	
		MULTIPLE ACCESS CONTROLLER		MAC	
		OPTIONAL CONTROL SWITCH DETAILS		SIZE	DWG. NO.
				REV	
				TAPE	SHEET
				61259	14
				PAGE	2-29

FUNCTION OPERATION

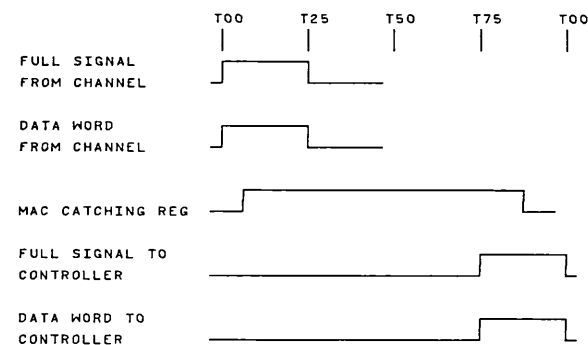


*FF TO BE SET DEPENDS ON FUNCTION CODE

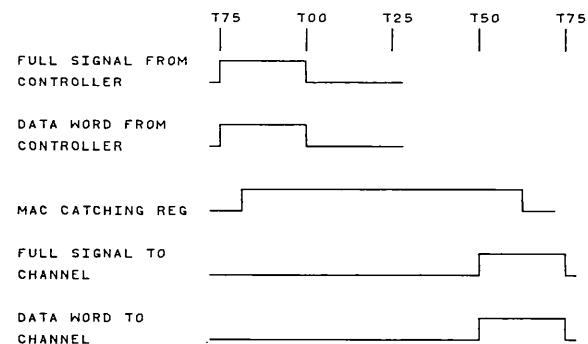
STATUS OPERATION



OUTPUT OPERATION



INPUT OPERATION



CONTROL DATA

TITLE
MULTIPLE ACCESS CONTROLLER
TIMING DIAGRAMS

PRODUCT

MAC
SIZE DWG. NO. REV
C
TAPE SHEET PAGE
13 2-31

SECTION 3
MAINTENANCE

This section contains general maintenance information for the MAC. The MAC is constructed of standard Control Data components with properties identical to those of the 6000 Series equipment, and requires a dust-free, air-conditioned environment. The MAC can use various Control Data power supplies. The Control Data Power Supplies Manual completely documents these supplies (see Literature Distribution Center catalog for publication number). The MAC can also be installed in various Control Data peripheral equipment cabinets. These cabinets are completely described in the Control Data Peripheral Equipment Cabinets Manual (see Literature Distribution Center catalog for publication number).

There are no diagnostic maintenance routines specifically for the MAC; however, routines which perform a diagnostic of the peripheral attached to the MAC would also perform a diagnostic of the MAC.

CHASSIS SPECIFICATIONS

Dimensions

Height 15-7/8 inches
 Width 19 inches
 Depth 9 inches

Chassis Weight 25 pounds

Power Requirements 400 cycle, 3-phase
 208 volts, 0.31 amp

Dissipation 93 watts

Cooling Requirements 320 BTU/hr.

TABLE 3-1. DATA CHANNEL TO MULTIPLE ACCESS
 CONTROLLER CABLE PIN ASSIGNMENTS

Input Cable	Color Code	Output Cable	Input Cable	Color Code	Output Cable
Data 2 ⁰	90	Data 2 ⁰	Data 2 ¹⁰	900	Cable 2 ¹⁰
Data 2 ¹	91	Data 2 ¹	Data 2 ¹¹	901	Cable 2 ¹¹
Data 2 ²	92	Data 2 ²	Active	902	Active
Data 2 ³	93	Data 2 ³	Inactive	903	Inactive
Data 2 ⁴	94	Data 2 ⁴	Full	904	Full
Data 2 ⁵	95	Data 2 ⁵	Empty	905	Empty
Data 2 ⁶	96	Data 2 ⁶	Clock (10 mc)	906	Function
Data 2 ⁷	97	Data 2 ⁷	Clock (1 mc)	907	MC
Data 2 ⁸	98	Data 2 ⁸	Not Used	908	Not Used
Data 2 ⁹	99	Data 2 ⁹			

TABLE 3-2. CHANNEL CONTROL DEVICE TO MULTIPLE
ACCESS CONTROLLER CABLE PIN ASSIGNMENTS (OPTIONAL)

Pin	Assignment
A	Disable Channel A
B	Disable Channel B
C	Disable Channel C
D	Channel A Busy
E	Channel B Busy
F	Channel C Busy
H	Disable Dead Start Master Clear Connect Channel A
J	Disable Dead Start Master Clear Connect Channel B
K	Disable Dead Start Master Clear Connect Channel C
L	Disable Channel D
M	Channel D Busy
N	Disable Dead Start Master Clear Connect Channel D
P-a	

CABLING INFORMATION

Table 3-3 lists the MAC cable connector assignments. The MAC cable connector panel terminates the channel control device to MAC cable; however, data channel, next synchronizer (pass-on and pass-back), and peripheral controller cables pass through this panel and are terminated at the cordwood module connectors.

TABLE 3-3. CABLE CONNECTOR ASSIGNMENTS

Cable Connector	Cable Destination
W01	Computer A Output
W02	Computer A Input
W03	Computer A Pass-On
W04	Computer A Pass-Back
W05	Computer B Output
W06	Computer B Input
W07	Computer B Pass-On
W08	Computer B Pass-Back
W09*	Peripheral Controller Output
W10*	Peripheral Controller Input
W11	Computer C Output
W12	Computer C Input
W13	Computer C Pass-On
W14	Computer C Pass-Back
W15	Computer D Output
W16	Computer D Input
W17	Computer D Pass-On
W18	Computer D Pass-Back
J01	External Channel Control Device

* Cable 52675000 is used when the peripheral controller is mounted in the same cabinet as MAC switch.
Cable 52675100 is used when the peripheral controller is external to the MAC switch cabinet.

CONTROL SWITCH OPTION

When a channel control device is not used with the MAC, the cable is omitted. Two special switch modules are installed in logic chassis positions E16 and D16. These modules are detailed on page 2-29.

MODULE TYPES

This section contains cordwood module schematics utilized by the MAC. and the MAC card placement chart. These logic schematics, plus the wire lists contained in Section 4, provide detailed maintenance information. The optional 8BMS and 8BNS modules are not included in the following module drawings. However, they are shown in sufficient detail on page 2-29.

SECTION 4
WIRE LISTS

KEY TO 6000 SERIES CABLE TAB AND MODULE TAB LISTING

These listings represent a point to point index of all logic wire runs in the equipment logic chassis. They are useful aids in troubleshooting and installing change orders in existing equipment.

MODULE TABS

This is a list of all module pin logic wire connections within a piece of equipment, excluding any pins that connect to cables (cable tabs). The order of the list is by chassis, module and pin, starting at 1A01-1. The list includes each module, each pin and its destination, and the length of the interconnecting wire. A cross check can be made by taking a given module pin location as an origin and checking the destination location to see if it reflects the origin location. This list is arranged in vertical columns for pins numbered 1 through 30. It is headed by the module location designation. Where appropriate, the module type designation is included at the left of the module location designation to eliminate additional references to the card placement chart. Pins 29 and 30 are power connections and are not used for logic wiring. Figure i illustrates a module tab example of a wire running from module 1C07 pin 5 to module 1C08 pin 13. It also shows the cross reference between the origin and destination of the wire run.

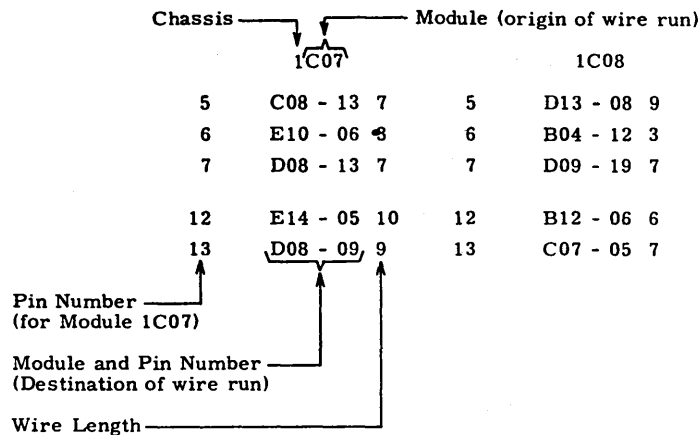


Figure i. Module Tab Definitions

MISCELLANEOUS WIRE TABS

This is an index of wires showing origin, destination, and wire length for the wire. Figure ii shows a sample wire tab.

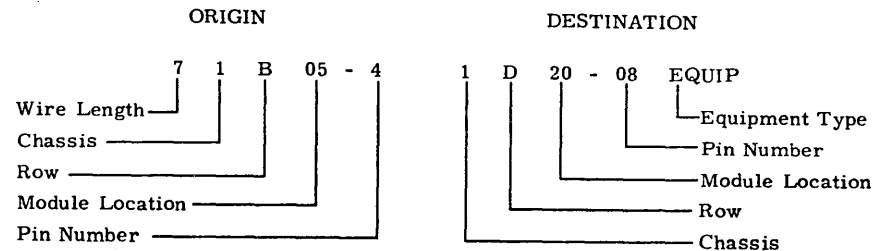


Figure ii. Standard Wire Tab Definitions

CABLE TABS

This listing is by module and pin number, and it shows all module pins that are wired to a cable running external to the piece of equipment. Figure iii is a sample cable tab listing with definitions of its meanings.

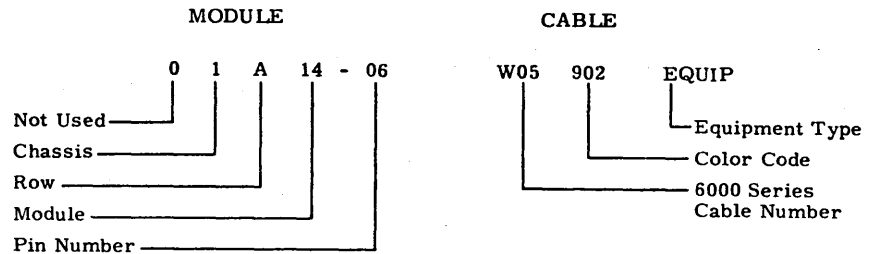


Figure iii. Cable Tab Definitions

MODULE TABS

TH	1A01	TH	1A02	Q1	1A03	Q1	1A04	Q1	1A05	Q1	1A06
1	A01-17 96	1	A12-15 15	1	-	1	-	1	-	-	
2	A02-16 108	2	C01- 7 21	2	-	2	-	2	-	-	
3	A01- 9 84	3	A06-12 7	3	-	3	-	3	-	3	-
4	A01-26 84	4	A07-18 84	4	-	4	-	4	-	4	-
5	A02-11 84	5	A05-12 7	5	-	5	-	5	-	5	C15-24 15
6	A02-14 168	6	A08-18 84	6	-	6	A15- 6 15	6	A15- 5 13	6	C16-24 17
7	-	7	-	7	C04-22 11	7	C05-22 11	7	C06-22 11	7	C14-20 15
8	A02-20 108	8	A09-18 11	8	A15- 3 17	8	A15- 4 15	8	-	8	-
9	A01- 3 84	9	-	9	C04-21 11	9	C05-21 11	9	C06-21 11	9	C07- 7 9
10	A02-17 108	10	A01-13 55	10	-	10	-	10	-	10	-
11	A02-19 96	11	A01- 5 84	11	-	11	-	11	A15-12 13	11	-
12	A02-18 108	12	-	12	A02-24 5	12	A02-22 5	12	A02- 5 7	12	A02- 3 7
13	A02-10 84	13	A01-23 108	13	-	13	-	13	-	13	-
14	-	14	A01- 6 168	14	-	14	-	14	-	14	-
15	-	15	A01-19 108	15	-	15	-	15	-	15	-
16	C03-15 11	16	A01- 2 108	16	-	16	-	16	-	16	-
17	A01- 1 96	17	A01-10 108	17	-	17	-	17	-	17	-
18	C04-15 11	18	A01-12 108	18	-	18	-	18	A15-10 13	18	-
19	A02-15 108	19	A01-11 96	19	-	19	-	19	-	19	-
20	C05-15 11	20	A01- 8 108	20	C03- 8 9	20	C04- 8 9	20	C05- 8 9	20	C07-21 11
21	A15-28 19	21	C01- 8 21	21	-	21	-	21	-	21	-
22	A15-21 19	22	A04-12 5	22	C03- 7 9	22	C04- 7 9	22	C05- 7 9	22	C06- 8 9
23	A02-13 108	23	C01-22 21	23	A15-13 15	23	-	23	-	23	-
24	C06-15 11	24	A03-12 5	24	-	24	-	24	-	24	-
25	C13- 1 17	25	-	25	A15-15 15	25	-	25	A15- 8 13	25	-
26	A01- 4 84	26	A14-16 15	26	-	26	-	26	-	26	-
27	-	27	-	27	-	27	-	27	-	27	-
28	A13-17 17	28	-	28	-	28	-	28	-	28	-
29	-	29	-	29	-	29	-	29	-	29	-
30	-	30	-	30	-	30	-	30	-	30	-

Q	1A7	Q	1A8	Q	1A9	SSN	1A10	SSP	1A11	SSR	1A12
1	-	1	-	1	-	1	R13-26 9	1	A09-16 7	1	-
2	-	2	-	2	-	2	R12-26 9	2	B12-10 7	2	-
3	-	3	-	3	-	3	A07-20 7	3	B12-16 7	3	-
4	A10-16 7	4	A11-21 7	4	A11-10 5	4	A08-27 7	4	E13- 3 17	4	-
5	-	5	-	5	-	5	A07-12 7	5	A09-15 5	5	-
6	A10-20 7	6	A11-24 7	6	A11- 7 5	6	R13-11 9	6	A09-27 7	6	-
7	-	7	-	7	-	7	A08-16 7	7	A09- 6 5	7	-
8	-	8	-	8	-	8	A08-25 5	8	B12-23 9	8	-
9	-	9	-	9	-	9	A08-14 7	9	A14-27 7	9	-
10	-	10	-	10	-	10	A08-12 5	10	A09- 4 5	10	-
11	A10-19 7	11	A11-18 7	11	A11-13 5	11	R13-10 7	11	C14-22 11	11	-
12	A10- 5 7	12	A10-10 5	12	C02-24 13	12	C13- 9 11	12	A09-17 5	12	-
13	-	13	-	13	-	13	A08-20 7	13	A09-11 5	13	A14-28 108
14	A10-28 7	14	A10- 9 7	14	-	14	R13- 6 7	14	C13- 5 11	14	-
15	A10-15 7	15	A11-22 7	15	A11- 5 5	15	A07-15 7	15	A09-19 5	15	A02- 1 15
16	A10-23 7	16	A10- 7 7	16	A11- 1 7	16	A07- 4 7	16	B12-20 7	16	-
17	A10-21 7	17	A11-27 7	17	A11-12 5	17	R13-20 7	17	B12-11 7	17	-
18	A02- 4 84	18	A02- 6 84	18	A02- 8 11	18	R13- 3 7	18	A08-11 7	18	-
19	A10-26 7	19	A11-19 7	19	A11-15 5	19	A07-11 7	19	A08-19 7	19	-
20	A10- 3 7	20	A10-13 7	20	C02-23 13	20	A07- 6 7	20	A13-15 7	20	A15- 1 7
21	-	21	-	21	-	21	A07-17 7	21	A08- 4 7	21	C16-27 13
22	-	22	-	22	-	22	A07-27 7	22	A08-15 7	22	C07-22 13
23	-	23	-	23	-	23	A07-16 7	23	A15-22 7	23	C06- 7 11
24	-	24	-	24	-	24	R13-16 7	24	A08- 6 7	24	C15-28 11
25	A10-25 7	25	A10- 8 5	25	-	25	A07-25 7	25	B12- 6 5	25	-
26	-	26	-	26	-	26	A07-19 7	26	A15-16 7	26	- X 2
27	A10-22 7	27	A10- 4 7	27	A11- 6 7	27	R13-23 7	27	A08-17 7	27	-
28	-	28	-	28	-	28	A07-14 7	28	B12- 3 5	28	A15-19 7
29	-	29	-	29	-	29	-	29	-	29	-
30	-	30	-	30	-	30	-	30	-	30	-

SSV 1A13				AE 1A14				BASS 1A15				1A16				TH 1801				HQ 1802			
1	-			1	C02- 2	19		1	A12-20	7	1	-				1	B01-17	96		1	D12-27	17	
2	C15-26	13		2	A15-25	7		2	A14-21	5	2	-				2	B02-16	108		2	C01- 5	21	
3	-			3	A15-26	5		3	A03- 8	17	3	-				3	B01- 9	84		3	E12-27	19	
4	-			4	- X	2		4	A04- 8	15	4	-				4	B01-26	84		4	B07-18	84	
5	-			5	- X	2		5	A05- 6	13	5	-				5	B02-11	108		5	B06-12	7	
6	-			6	-			6	A04- 6	15	6	-				6	B02-14	168		6	B08-18	84	
7	-			7	- X	2		7	E13- 4	17	7	-				7	-			7	B05-12	7	
8	-			8	-			8	A05-25	13	8	-				8	B02-20	108		8	B09-18	11	
9	A14-17	5		9	A13-20	5		9	E13-20	17	9	-				9	B01- 3	84		9	-		
10	-			10	-			10	A05-18	13	10	-				10	B02-17	108		10	B01-13	55	
11	E15-11	17		11	A15-18	5		11	D13-16	15	11	-				11	B02-19	96		11	B01- 5	108	
12	-			12	- X	2		12	A05-11	13	12	-				12	B02-18	108		12	-		
13	C01-15	19		13	- X	2		13	A03-23	15	13	-				13	B02-10	55		13	B01-23	108	
14	B15-11	7		14	A15-23	5		14	A15-27	5	14	-				14	-			14	B01- 6	168	
15	A11-20	7		15	A15-24	5		15	A03-25	15	15	-				15	-			15	B01-19	108	
16	D15-11	13		16	A02-26	15		16	A11-26	7	16	-				16	C04-11	9		16	B01- 2	108	
17	A01-28	17		17	A13- 9	5		17	A14-19	5	17	-				17	B01- 1	96		17	B01-10	108	
18	- X	2		18	C13- 4	9		18	A14-11	5	18	-				18	C05-11	9		18	B01-12	108	
19	-			19	A15-17	5		19	A12-28	7	19	-				19	B02-15	108		19	B01-11	96	
20	A14- 9	5		20	C14-18	9		20	A13-24	5	20	-				20	C06-11	11		20	B01- 8	108	
21	-			21	A15- 2	5		21	A01-22	19	21	-				21	B15-28	19		21	C01- 6	21	
22	-			22	- X	2		22	A11-23	7	22	-				22	B15-21	19		22	B04-12	5	
23	-			23	- X	2		23	A14-14	5	23	-				23	B02-13	108		23	C01-24	21	
24	A15-20	5		24	C16-28	11		24	A14-15	5	24	-				24	C07-11	11		24	B03-12	5	
25	-			25	-			25	A14- 2	7	25	-				25	C13-11	17		25	-		
26	-			26	- X	2		26	A14- 3	5	26	-				26	B01- 4	84		26	B14-16	15	
27	-			27	A11- 9	7		27	A15-14	5	27	-				27	-			27	-		
28	-			28	A12-13	108		28	A01-21	19	28	-				28	D13-25	19		28	-		
29	-			29	-			29	-		29	-				29	-			29	-		
30	-			30	-			30	-		30	-				30	-			30	-		

QI	1803	QI	1804	QI	1805	QI	1806	QI	1807	QI	1808
1	-	1	-	1	-	1	-	1	-	1	-
2	-	2	-	2	-	2	-	2	-	2	-
3	-	3	-	3	-	3	-	3	-	3	-
4	-	4	-	4	-	4	-	4	B10-16 7	4	B11-21 7
5	-	5	-	5	-	5	C15- 7 15	5	-	5	-
6	-	6	H15- 6 15	6	H15- 5 13	6	C16- 5 15	6	B10-20 7	6	B11-24 7
7	C04-24 9	7	C05-24 9	7	C06-24 9	7	C14- 3 13	7	-	7	-
8	B15- 3 17	8	H15- 4 15	8	-	8	-	8	-	8	-
9	C04-23 9	9	C05-23 9	9	C06-23 9	9	C07- 5 7	9	-	9	-
10	-	10	-	10	-	10	-	10	-	10	-
11	-	11	-	11	H15-12 13	11	-	11	B10-19 7	11	B11-18 7
12	B02-24 5	12	H02-22 5	12	H02- 7 7	12	H02- 5 7	12	B10- 5 7	12	B10-10 5
13	-	13	-	13	-	13	-	13	-	13	-
14	-	14	-	14	-	14	-	14	B10-28 7	14	B10- 9 7
15	-	15	-	15	-	15	-	15	B10-15 7	15	B11-22 7
16	-	16	-	16	-	16	-	16	B10-23 7	16	B10- 7 7
17	-	17	-	17	-	17	-	17	B10-21 7	17	B11-27 7
18	-	18	-	18	H15-10 13	18	-	18	H02- 4 84	18	H02- 6 84
19	-	19	-	19	-	19	-	19	B10-26 7	19	B11-19 7
20	C03- 6 5	20	C04- 6 5	20	C05- 6 5	20	C07-23 7	20	B10- 3 7	20	B10-13 7
21	-	21	-	21	-	21	-	21	-	21	-
22	C03- 5 5	22	C04- 5 5	22	C05- 5 5	22	C06- 6 5	22	-	22	-
23	B15-13 15	23	-	23	-	23	-	23	-	23	-
24	-	24	-	24	-	24	-	24	-	24	-
25	B15-15 15	25	-	25	H15- 8 13	25	-	25	B10-25 7	25	B10- 8 5
26	-	26	-	26	-	26	-	26	-	26	-
27	-	27	-	27	-	27	-	27	B10-22 7	27	B10- 4 7
28	-	28	-	28	-	28	-	28	-	28	-
29	-	29	-	29	-	29	-	29	-	29	-
30	-	30	-	30	-	30	-	30	-	30	-

QJ	1810	SSN	1810	SSP	1811	TQ	1812	TQ	1813	AE	1814						
1	-	1	H13-28	7	1	H09-16	7	1	H11-28	7	1	C02- 5	17				
2	-	2	H12-28	7	2	H12- 8	5	2	C11-16	9	2	B15-25	7				
3	-	3	H07-20	7	3	H12-14	5	3	A11-28	5	3	B15-26	5				
4	H11-10	5	4	H08-27	7	4	E13- 5	13	4	H11-25	5	4	- x	2			
5	-	5	H07-12	7	5	H09-15	5	5	C11- 3	7	5	- x	2				
6	H11- 7	5	6	H13- 9	7	6	H09-27	7	6	A11-25	5	6	-				
7	-	7	H08-16	7	7	H09- 6	5	7	C12- 3	7	7	C11-11	7	7	- x	2	
8	-	8	H08-25	5	8	H12-25	5	8	H11- 2	5	8	B10-11	7	8	-		
9	-	9	H08-14	7	9	H14-27	7	9	H11-17	5	9	B10- 6	7	9	D13-20	11	
10	-	10	H08-12	5	10	H09- 4	5	10	A11- 2	7	10	A10-11	7	10	-		
11	H11-13	5	11	H13- 8	7	11	C14- 1	7	11	A11-17	7	11	A10- 6	9	11	B15-18	5
12	C02- 7	11	12	C13-13	9	12	H09-17	5	12	C12- 7	7	12	C11-15	7	12	- x	2
13	-	13	H08-20	7	13	H09-11	5	13	C12-16	7	13	C10-13	9	13	- x	2	
14	-	14	H13- 4	7	14	C13-19	9	14	H11- 3	5	14	B10-24	7	14	B15-23	5	
15	H11- 5	5	15	H07-15	7	15	H09-19	5	15	-	15	-	15	B15-24	5		
16	H11- 1	7	16	H07- 4	7	16	B12-22	5	16	A11- 3	7	16	A10-24	7	16	B02-26	15
17	H11-12	5	17	B13-22	7	17	H12- 9	5	17	-	17	-	17	C15-15	7		
18	H02- 8	11	18	H13- 1	7	18	H08-11	7	18	-	18	-	18	C13- 8	7		
19	H11-15	5	19	H07-11	7	19	H08-19	7	19	-	19	-	19	B15-17	5		
20	C02-10	11	20	H07- 6	7	20	D13-15	11	20	A11-16	7	20	A10-17	7	20	C14- 5	5
21	-	21	H07-17	7	21	H08- 4	7	21	C11- 7	5	21	C10- 7	7	21	B15- 2	5	
22	-	22	H07-27	7	22	H08-15	7	22	H11-16	5	22	H10-17	7	22	- x	2	
23	-	23	H07-16	7	23	B15-22	7	23	A11- 8	9	23	A10-27	7	23	- x	2	
24	-	24	H13-14	7	24	H08- 6	7	24	C12-13	5	24	C10-15	7	24	C16- 1	5	
25	- x	2	25	H07-25	7	25	B12- 4	5	25	H11- 8	5	25	B10-27	7	25	-	
26	-	26	H07-19	7	26	B15-16	7	26	A10- 2	9	26	A10- 1	9	26	- x	2	
27	H11- 6	7	27	B13-25	7	27	H08-17	7	27	C11-13	5	27	C10-11	7	27	B11- 9	7
28	-	28	H07-14	7	28	H12- 1	7	28	H10- 2	7	28	B10- 1	7	28	E12-12	108	
29	-	29	-		29	-		29	-		29	-		29	-		
30	-	30	-		30	-		30	-		30	-		30	-		

BASS	1815			1816	TG	1C01	TQ	1C02	TG	1C03	TG	1C04	
1	E12-9	15	1	-	1	E02-2	21	1 C14-2	15	1 E03-22	11	1 E04-22	11
2	B14-21	5	2	-	2	E02-21	21	2 A14-1	19	2 E03-20	11	2 E04-20	11
3	B03-8	17	3	-	3	D02-2	21	3 C15-27	17	3 D03-22	9	3 D04-22	9
4	B14-8	15	4	-	4	D02-21	21	4 C14-4	15	4 D03-20	7	4 D04-20	7
5	B05-6	13	5	-	5	H02-2	21	5 B14-1	17	5 B03-22	5	5 B04-22	5
6	B04-6	15	6	-	6	H02-21	21	6 C15-5	17	6 B03-20	5	6 B04-20	5
7	E13-8	13	7	-	7	A02-2	21	7 B09-12	11	7 A03-22	9	7 A04-22	9
8	B05-25	13	8	-	8	A02-21	21	8 C01-23	5	8 A03-20	9	8 A04-20	9
9	E13-26	15	9	-	9	-		9 C01-27	5	9 -		9 -	
10	B05-18	13	10	-	10	E01-25	21	10 B09-20	11	10 C08-20	9	10 C08-24	9
11	A13-14	7	11	-	11	D13-13	17	11 F09-20	13	11 C13-15	13	11 B01-16	9
12	B05-11	13	12	-	12	C14-28	17	12 F09-12	13	12 C02-15	5	12 C02-17	5
13	B03-23	15	13	-	13	E01-28	21	13 B09-12	11	13 C08-11	9	13 C08-7	7
14	-		14	-	14	-		14 C01-25	5	14 -		14 -	
15	B03-25	15	15	-	15	A13-13	19	15 C03-12	5	15 A01-16	11	15 A01-18	11
16	B11-26	7	16	-	16	E13-18	19	16 B09-20	13	16 D01-16	7	16 D01-18	9
17	B14-19	5	17	-	17	-		17 C04-12	5	17 -		17 C08-9	7
18	B14-11	5	18	-	18	D01-28	64	18 C13-20	15	18 -		18 -	
19	D12-12	11	19	-	19	-		19 C05-12	7	19 -		19 -	
20	D13-17	11	20	-	20	D12-3	15	20 F15-28	19	20 -		20 C08-22	7
21	B01-22	19	21	-	21	C02-25	5	21 D13-24	17	21 -		21 A03-9	11
22	B11-23	7	22	-	22	A02-23	21	22 F15-21	19	22 -		22 A03-7	11
23	B14-14	5	23	-	23	C02-8	5	23 A09-20	13	23 -		23 B03-9	9
24	B14-15	5	24	-	24	H02-23	21	24 A09-12	13	24 -		24 B03-7	9
25	B14-2	7	25	-	25	C02-14	5	25 C01-21	5	25 -		25 D03-9	5
26	B14-3	5	26	-	26	D02-23	21	26 B15-28	17	26 -		26 D03-7	5
27	C14-19	7	27	-	27	C02-9	5	27 D13-12	17	27 -		27 E03-9	9
28	B01-21	19	28	-	28	E02-23	21	28 B15-21	17	28 -		28 E03-7	9
29	-		29	-	29	-		29 -		29 -		29 -	
30	-		30	-	30	-		30 -		30 -		30 -	

	TG	IC*5		TG	IC*6		TG	IC07		JQ	IC08		JQ	IC09		UP	IC10
1	E05-22	11	1	E12-23	15	1	E06- 9	11	1	-		1	-		1	D10-14	7
2	E05-20	11	2	E06-22	11	2	C15- 9	13	2	-		2	-		2	E13-19	13
3	D05-22	9	3	D12-23	11	3	D06- 9	7	3	-		3	-		3	B13- 5	7
4	D05-20	7	4	D06-22	7	4	C15-14	11	4	-		4	-		4	-	
5	B05-22	5	5	D12- 9	11	5	H06- 9	7	5	C05-17	7	5	C07-13	5	5	-	
6	B05-20	5	6	B06-22	5	6	C15- 8	11	6	-		6	-		6	-	
7	A05-22	9	7	A12-23	11	7	A06- 9	9	7	C04-13	7	7	C07-20	7	7	B13-21	7
8	A05-20	9	8	A06-22	9	8	C15-23	13	8	-		8	-		8	-	
9	-		9	-		9	-		9	C04-17	7	9	C07-17	5	9	D01-22	15
10	C09-18	7	10	C09-22	7	10	C09-26	7	10	-		10	-		10	D10-17	7
11	B01-18	9	11	H01-20	11	11	B01-24	11	11	C03-13	9	11	C06-17	7	11	B13-27	7
12	C02-19	7	12	C13-26	11	12	C13-24	9	12	-		12	-		12	E10-14	9
13	C09-13	7	13	C09-24	7	13	C09- 5	5	13	-		13	C05-13	7	13	B13-13	9
14	-		14	-		14	-		14	F01-18	13	14	E01-16	15	14	E13-17	11
15	A01-20	11	15	A01-24	11	15	C13- 3	9	15	-		15	-		15	B13-24	7
16	D01-20	9	16	D01-24	11	16	C13-16	9	16	-		16	-		16	B13- 2	9
17	C08- 5	7	17	C09-11	7	17	C09- 9	5	17	- X	2	17	- X	2	17	D10-24	7
18	-		18	-		18	-		18	-		18	C05-10	7	18	-	
19	-		19	-		19	-		19	-		19	-		19	D10- 1	5
20	C08-26	7	20	C09-20	7	20	C09- 7	7	20	C03-10	9	20	C06-20	7	20	-	
21	A04- 9	11	21	A05- 9	11	21	A06-20	11	21	-		21	-		21	D10-27	7
22	A04- 7	11	22	A05- 7	11	22	A12-22	13	22	C04-20	7	22	C06-10	7	22	D10-18	7
23	B04- 9	9	23	H05- 9	9	23	H06-20	7	23	-		23	-		23	E10-27	9
24	B04- 7	9	24	B05- 7	9	24	E12- 7	11	24	C04-10	9	24	C06-13	7	24	E10-18	9
25	D04- 9	5	25	D05- 9	5	25	D06-20	7	25	-		25	-		25	E10-24	9
26	D04- 7	5	26	D05- 7	5	26	D12-22	9	26	C05-20	7	26	C07-10	7	26	F10-17	9
27	E04- 9	9	27	E05- 9	9	27	E06-20	9	27	-		27	-		27	F10- 1	7
28	E04- 7	9	28	E05- 7	9	28	E12-22	11	28	-		28	-		28	-	
29	-		29	-		29	-		29	-		29	-		29	-	
30	-		30	-		30	-		30	-		30	-		30	-	

TP	IC11	TP	IC12	V31	IC13	TR	IC14	TQ	IC15	TR	IC16
1	D11-25 0	1	E11- 2 7	1	A01-25 17	1	A11-11 7	1	D13- 3 7	1	A14-24 5
2	E13-23 17	2	E13-11 11	2	C14-25 7	2	A2- 1 15	2	D14- 1 7	2	- X 2
3	B12- 5 7	3	H12- 7 7	3	C07-15 9	3	A26- 7 13	3	D12-24 9	3	C16-13 5
4	-	4	-	4	A14-18 9	4	A2- 4 15	4	D13- 6 7	4	-
5	-	5	-	5	A11-14 11	5	A14-20 5	5	C02- 6 17	5	B06- 6 15
6	-	6	-	6	C14-10 5	6	- X 2	6	E12-10 11	6	-
7	B12-21 5	7	H12-12 7	7	-	7	A11-11 9	7	B06- 5 15	7	C16-20 5
8	-	8	-	8	H14-18 7	8	- X 2	8	C07- 6 11	8	-
9	D01-21 15	9	D01-15 17	9	A10-12 11	9	D06- 7 13	9	C07- 2 13	9	D12-21 9
10	D11-16 7	10	D11-17 7	10	D01-25 17	10	A13- 6 5	10	-	10	-
11	B13- 7 7	11	-	11	H01-25 17	11	A14-20 7	11	-	11	- X 2
12	E11-25 17	12	E11- 2 9	12	D10-12 9	12	E13-22 11	12	E06- 5 15	12	- X 2
13	B12-27 5	13	H12-24 5	13	H10-12 9	13	E11-11 11	13	D06- 5 13	13	C16- 3 5
14	E13-21 17	14	E13-25 11	14	D11-14 7	14	E13- 6 9	14	C07- 4 11	14	E12-21 11
15	B13-12 7	15	-	15	C03-11 13	15	A26- 7 15	15	H14-17 7	15	D12- 7 9
16	B12- 2 9	16	H12-13 7	16	C07-16 9	16	A14-21 5	16	-	16	C16-21 3
17	D10- 2 5	17	D11- 8 7	17	-	17	E14-20 9	17	D14-17 7	17	- X 2
18	-	18	-	18	-	18	A14-20 9	18	D13- 9 7	18	D06- 6 15
19	D10-11 7	19	-	19	H11-14 9	19	A15-27 7	19	E14-17 9	19	E14-24 9
20	-	20	-	20	C02-18 15	20	A26- 7 15	20	E12-24 11	20	C16- 7 5
21	D10- 6 5	21	-	21	D14-18 7	21	A14-16 5	21	E14- 1 9	21	C16-16 3
22	D11-28 7	22	D11- 3 5	22	E11-14 9	22	A11-11 11	22	D13- 2 7	22	D14-24 7
23	E10- 6 9	23	-	23	D14- 8 5	23	- X 2	23	C07- 8 13	23	E06- 6 17
24	E11-28 9	24	E11- 3 9	24	C07-12 9	24	E15-14 9	24	A06- 5 15	24	A06- 6 17
25	E10- 2 9	25	E11- 8 9	25	E14-18 9	25	A13- 2 7	25	-	25	C16-26 3
26	E11-16 9	26	E11-17 9	26	C06-12 11	26	- X 2	26	A13- 2 13	26	C16-25 3
27	E10-11 9	27	-	27	E14- 8 9	27	- X 2	27	C02- 3 17	27	A12-21 13
28	-	28	-	28	E10-12 9	28	A21-12 17	28	A12-24 11	28	A14-24 11
29	-	29	-	29	-	29	-	29	-	29	-
30	-	30	-	30	-	30	-	30	-	30	-

TH	1001	HQ	1002	Q1	1003	Q1	1004	Q1	1005	Q1	1006
1	D01-17 06	1	D12-15 15	1	-	1	-	1	-	1	-
2	D02-16 15A	2	C01- 3 21	2	-	2	-	2	-	2	-
3	D01- 9 A4	3	D06-12 7	3	-	3	-	3	-	3	-
4	D01-26 A4	4	D07-14 A4	4	-	4	-	4	-	4	-
5	D02-11 15A	5	D05-12 7	5	-	5	-	5	-	5	C15-13 13
6	D02-14 16A	6	D08-18 84	6	-	6	D15- 6 15	6	D15- 5 13	6	C16-18 15
7	-	7	-	7	C04-26 5	7	C05-26 5	7	C06-26 5	7	C14- 9 13
8	D02-20 15A	8	D09-18 11	8	D15- 3 17	8	D15- 4 15	8	-	8	-
9	D01- 3 A4	9	-	9	C04-25 5	9	C05-25 5	9	C06-25 5	9	C07- 3 7
10	D02-17 15A	10	D01-13 55	10	-	10	-	10	-	10	-
11	D02-19 06	11	D01- 5 108	11	-	11	-	11	D15-12 13	11	-
12	D02-18 15A	12	-	12	D02-24 5	12	D02-22 5	12	D02- 5 7	12	D02- 3 7
13	D02-10 55	13	D01-23 108	13	-	13	-	13	-	13	-
14	-	14	D01- 6 168	14	-	14	-	14	-	14	-
15	C12- 9 17	15	D01-19 108	15	-	15	-	15	-	15	-
16	C03-16 7	16	D01- 2 108	16	-	16	-	16	-	16	-
17	D01- 1 06	17	D01-10 108	17	-	17	-	17	-	17	-
18	C04-16 9	18	D01-12 108	18	-	18	-	18	D15-10 13	18	-
19	D02-15 15A	19	D01-11 96	19	-	19	-	19	-	19	-
20	C05-16 9	20	D01- 8 108	20	C03- 4 7	20	C04- 4 7	20	C05- 4 7	20	C07-25 7
21	C11- 9 15	21	C01- 4 21	21	-	21	-	21	-	21	-
22	C10- 9 15	22	D04-12 5	22	C03- 3 9	22	C04- 3 9	22	C05- 3 9	22	C06- 4 7
23	D02-13 15A	23	C01-26 21	23	D15-13 15	23	-	23	-	23	-
24	C06-16 11	24	D03-12 5	24	-	24	-	24	-	24	-
25	C13-10 17	25	-	25	D15-15 15	25	-	25	D15- 8 13	25	-
26	D01- 4 A4	26	D14-16 15	26	-	26	-	26	-	26	-
27	-	27	-	27	-	27	-	27	-	27	-
28	C01-18 A4	28	-	28	-	28	-	28	-	28	-
29	-	29	-	29	-	29	-	29	-	29	-
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Q	1007	Q1	1008	Q1	1009	SSN	1010	SSP	1011	SSR	1012
1	-	1	-	1	-	1	C10-19 5	1	D09-16 7	1	-
2	-	2	-	2	-	2	C11-17 5	2	C12- 1 7	2	-
3	-	3	-	3	-	3	n07-20 7	3	C12-22 5	3	C01-20 15
4	D10-16 7	4	D11-21 7	4	D11-10 5	4	n08-27 7	4	E13- 7 9	4	E01-21 17
5	-	5	-	5	-	5	n07-12 7	5	D09-15 5	5	-
6	D10-20 7	6	D11-24 7	6	D11- 7 5	6	C11-21 5	6	D09-27 7	6	-
7	-	7	-	7	-	7	n08-16 7	7	D09- 6 5	7	C16-15 9
8	-	8	-	8	-	8	n08-25 5	8	C12-17 7	8	-
9	-	9	-	9	-	9	n08-14 7	9	D14-27 7	9	C06- 5 11
10	-	10	-	10	-	10	n08-12 5	10	D09- 4 5	10	- x 2
11	D10-19 7	11	D11-18 7	11	D11-13 5	11	C11-19 7	11	C14- 7 9	11	-
12	D10- 5 7	12	D10-10 5	12	C02-13 11	12	C13-12 9	12	D09-17 5	12	H15-19 11
13	-	13	-	13	-	13	n08-20 7	13	D09-11 5	13	D14-28 108
14	D10-28 7	14	D10- 9 7	14	-	14	C10- 1 7	14	C13-14 7	14	-
15	D10-15 7	15	D11-22 7	15	D11- 5 5	15	n07-15 7	15	D09-19 5	15	D02- 1 15
16	D10-23 7	16	D10- 7 7	16	D11- 1 7	16	n07- 4 7	16	C11-10 7	16	-
17	D10-21 7	17	D11-27 7	17	D11-12 5	17	C10-10 7	17	C12-10 7	17	-
18	D02- 4 84	18	D02- 6 84	18	D02- 8 11	18	C10-22 7	18	D08-11 7	18	-
19	D10-26 7	19	D11-19 7	19	D11-15 5	19	n07-11 7	19	D08-19 7	19	-
20	D10- 3 7	20	D10-13 7	20	C02-16 13	20	n07- 6 7	20	E13-16 7	20	D15- 1 7
21	-	21	-	21	-	21	n07-17 7	21	D08- 4 7	21	C16- 9 9
22	-	22	-	22	-	22	n07-27 7	22	D08-15 7	22	C07-26 9
23	-	23	-	23	-	23	n07-16 7	23	D15-22 7	23	C06- 3 11
24	-	24	-	24	-	24	C10-17 7	24	D08- 6 7	24	C15- 3 9
25	D10-25 7	25	D10- 8 5	25	- x 2	25	n07-25 7	25	C11- 1 9	25	-
26	-	26	-	26	-	26	n07-19 7	26	D15-16 7	26	- x 2
27	D10-22 7	27	D10- 4 7	27	D11- 6 7	27	C10-21 7	27	D08-17 7	27	H02- 1 17
28	-	28	-	28	-	28	n07-14 7	28	C11-22 7	28	D15-19 7
29	-	29	-	29	-	29	-	29	-	29	-
30	-	30	-	30	-	30	-	30	-	30	-

SSV	1013	AE	1014	BASS	1015	1016	TH	1E01	HQ	1E02
1	-	1	C15- 2 7	1	012-20 7 7	-	1	E01-17 96	1	E12-15 15
2	C15-22 7	2	015-25 7	2	014-21 5 2	-	2	E02-16 108	2	C01- 1 21
3	C15- 1 7	3	015-26 5	3	003- 8 17 3	-	3	E01- 9 84	3	E06-12 7
4	-	4	- X 2	4	004- 8 15 4	-	4	E01-26 84	4	E07-18 84
5	-	5	- X 2	5	005- 6 13 5	-	5	E02-11 108	5	E05-12 7
6	C15- 4 7	6	-	6	004- 6 15 6	-	6	E02-14 168	6	E08-18 84
7	-	7	- X 2	7	E13-10 7 7	-	7	-	7	-
8	-	8	C13-23 5	8	005-25 13 8	-	8	E02-20 108	8	E09-18 11
9	C15-18 7	9	-	9	013-11 5 9	-	9	E01- 3 84	9	-
10	-	10	E13-27 9	10	005-18 13 10	-	10	E02-17 108	10	E01-13 55
11	015- 9 5	11	015-18 5	11	A13-16 13 11	-	11	E02-19 96	11	E01- 5 108
12	C02-27 17	12	- X 2	12	005-11 13 12	-	12	E02-18 108	12	-
13	C01-11 17	13	- X 2	13	003-23 15 13	-	13	E02-10 55	13	E01-23 108
14	E15- 9 7	14	015-23 5	14	-	14	-	-	14	E01- 6 168
15	B11-20 17	15	015-24 5	15	003-25 15 15	-	15	-	15	E01-19 108
16	A15-11 15	16	002-26 15	16	011-26 7 16	-	16	C09-14 15	16	E01- 2 108
17	B15-20 17	17	C15-17 7	17	014-19 5 17	-	17	E01- 1 96	17	E01-10 108
18	- X 2	18	C13-21 7	18	014-11 5 18	-	18	C08-14 13	18	E01-12 108
19	-	19	015-17 5	19	012-28 7 19	-	19	E02-15 108	19	E01-11 96
20	B14- 9 17	20	C14-11 7	20	013-21 5 20	-	20	-	20	E01- 8 108
21	015-20 5	21	015- 2 5	21	C02-28 17 21	-	21	012- 4 17	21	C01- 2 21
22	-	22	- X 2	22	011-23 7 22	-	22	E12- 4 15	22	E04-12 5
23	-	23	- X 2	23	014-14 5 23	-	23	E02-13 108	23	C01-28 21
24	C02-21 17	24	C16-22 7	24	014-15 5 24	-	24	-	24	E03-12 5
25	B01-28 19	25	-	25	014- 2 7 25	-	25	C01-10 21	25	-
26	-	26	- X 2	26	014- 3 5 26	-	26	E01- 4 84	26	E14-16 15
27	-	27	011- 9 7	27	E13-12 7 27	-	27	-	27	-
28	E15-20 7	28	012-13 108	28	C02-26 17 28	-	28	C01-13 21	28	-
29	-	29	-	29	-	29	-	-	29	-
30	-	30	-	30	-	30	-	-	30	-

QI	1E03	QI	1E04	QI	1E05	QI	1E06	QI	1E07	QI	1E08
1	-	1	-	1	-	1	-	1	-	1	-
2	-	2	-	2	-	2	-	2	-	2	-
3	-	3	-	3	-	3	-	3	-	3	-
4	-	4	-	4	-	4	-	4	E10-16 7	4	E11-21 7
5	-	5	-	5	-	5	C15-12 15	5	-	5	-
6	-	6	E15- 4 15	6	E15- 5 13	6	C16-23 17	6	E10-20 7	6	E11-24 7
7	C04-28 9	7	C05-28 9	7	C06-28 9	7	C14-15 15	7	-	7	-
8	E15- 3 17	8	E15- 4 15	8	-	8	-	8	-	8	-
9	C04-27 9	9	C05-27 9	9	C06-27 9	9	C07- 1 11	9	-	9	-
10	-	10	-	10	-	10	-	10	-	10	-
11	-	11	-	11	E15-12 13	11	-	11	E10-19 7	11	E11-18 7
12	E02-24 5	12	E02-22 5	12	E02- 5 7	12	E02- 3 7	12	E10- 5 7	12	E10-10 5
13	-	13	-	13	-	13	-	13	-	13	-
14	-	14	-	14	-	14	-	14	E10-28 7	14	E10- 9 7
15	-	15	-	15	-	15	-	15	E10-15 7	15	E11-22 7
16	-	16	-	16	-	16	-	16	E10-23 7	16	E10- 7 7
17	-	17	-	17	-	17	-	17	E10-21 7	17	E11-27 7
18	-	18	-	18	E15-10 13	18	-	18	E02- 4 84	18	E02- 6 84
19	-	19	-	19	-	19	-	19	E10-26 7	19	E11-19 7
20	C03- 2 11	20	C04- 2 11	20	C05- 2 11	20	C07-27 9	20	E10- 3 7	20	E10-13 7
21	-	21	-	21	-	21	-	21	-	21	-
22	C03- 1 11	22	C04- 1 11	22	C05- 1 11	22	C06- 2 11	22	-	22	-
23	E15-13 15	23	-	23	-	23	-	23	-	23	-
24	-	24	-	24	-	24	-	24	-	24	-
25	E15-15 15	25	-	25	E15- 8 13	25	-	25	E10-25 7	25	E10- 8 5
26	-	26	-	26	-	26	-	26	-	26	-
27	-	27	-	27	-	27	-	27	E10-22 7	27	E10- 4 7
28	-	28	-	28	-	28	-	28	-	28	-
29	-	29	-	29	-	29	-	29	-	29	-
30	-	30	-	30	-	30	-	30	-	30	-

QI	1F*9	SSN	1-10	SSP	1E11	SSN	1E12	TP	1E13	AE	1E14			
1	-	1	C10-27	7	1	E09-16	7	1	- X	2	1	C15-21	9	
2	-	2	C11-25	9	2	C12-12	9	2	-		2	E15-25	7	
3	-	3	F07-20	7	3	C12-24	9	3	- X	2	3	E15-26	5	
4	E11-10	5	4	E08-27	7	4	E13- 9	7	4	F01-22	15	4	- X	2
5	-	5	5	E07-12	7	5	E09-15	5	5	-		5	- X	2
6	E11- 7	5	6	C11-23	9	6	E09-27	7	6	-		6	-	
7	-	7	7	E08-16	7	7	E09- 6	5	7	C07-24	11	7	- X	2
8	-	8	8	E08-25	5	8	C12-25	9	8	-		8	B15- 7	13
9	-	9	9	E08-14	7	9	E14-27	7	9	A15- 1	15	9	-	
10	-	10	10	E08-12	5	10	E09- 4	5	10	C15- 6	11	10	D15- 7	7
11	E11-13	5	11	C11-27	9	11	C14-13	11	11	-		11	C12- 2	11
12	C02-12	13	12	C13-28	9	12	E09-17	5	12	A14-28	108	12	D15-27	7
13	-	13	13	E08-20	7	13	E09-11	5	13	F14-28	108	13	- X	2
14	-	14	14	C10-12	9	14	C13-22	9	14	-		14	E14-10	5
15	E11- 5	5	15	E07-15	7	15	E09-19	5	15	F02- 1	15	15	- X	2
16	E11- 1	7	16	E07- 4	7	16	C11-26	9	16	-		16	D11-20	7
17	E11-12	5	17	C10-26	9	17	C12-26	9	17	-		17	C10-14	11
18	E02- 8	11	18	C10-24	9	18	E08-11	7	18	-		18	C01-16	19
19	E11-15	5	19	E07-11	7	19	E08-19	7	19	-		19	C10- 2	13
20	C02-11	13	20	E07- 6	7	20	E13- 2	7	20	F15- 1	7	20	A15- 9	17
21	-	21	21	E07-17	7	21	E08- 4	7	21	C16-14	11	21	C11-14	11
22	-	22	22	E07-27	7	22	E08-15	7	22	C07-28	11	22	C14-12	11
23	-	23	23	E07-16	7	23	E15-22	7	23	C06- 1	15	23	C11- 2	13
24	-	24	24	C10-25	9	24	E08- 6	7	24	C15-20	11	24	E15- 7	7
25	- X	2	25	E07-25	7	25	C11-12	11	25	-		25	C12-14	11
26	-	26	26	E07-19	7	26	E15-16	7	26	- X	2	26	H15- 9	15
27	E11- 6	7	27	C10-23	9	27	E08-17	7	27	A02- 3	19	27	D14-10	9
28	-	28	28	E07-14	7	28	C11-24	9	28	F15-19	7	28	- X	2
29	-	29	-		29	-		29	-		29	-		
30	-	30	-		30	-		30	-		30	-		

	CLASS	1815		D-15
1	E12-20	7	1	-
2	E14-21	5	2	-
3	E13-19	17	3	-
4	E14-18	15	4	-
5	E15-16	13	5	-
6	E14-16	15	6	-
7	E13-24	7	7	-
8	E15-25	13	8	-
9	D13-14	7	9	-
10	E15-18	13	10	-
11	A13-11	17	11	-
12	E15-11	13	12	-
13	E13-23	15	13	-
14	C14-24	9	14	-
15	E13-25	15	15	-
16	E11-26	7	16	-
17	E14-19	5	17	-
18	E14-11	5	18	-
19	E12-28	7	19	-
20	D13-28	7	20	-
21	C12-22	19	21	-
22	E11-23	7	22	-
23	E14-14	5	23	-
24	E14-15	5	24	-
25	E14-2	7	25	-
26	E14-3	5	26	-
27	- X	2	27	-
28	C12-20	19	28	-
29	-		29	-
30	-		30	-

CABLE TABS

1W01-90	1E03-26	OUT CABLF CH A
1W01-91	1E03-16	OUT CABLF CH A
1W01-92	1E03-13	OUT CABLF CH A
1W01-93	1E03-3	OUT CABLF CH A
1W01-94	1E04-26	OUT CABLF CH A
1W01-95	1E04-16	OUT CABLF CH A
1W01-96	1E04-13	OUT CABLF CH A
1W01-97	1E04-3	OUT CABLF CH A
1W01-98	1E05-26	OUT CABLF CH A
1W01-99	1E05-16	OUT CABLF CH A
1W01-900	1E05-13	OUT CABLF CH A
1W01-901	1E05-3	OUT CABLF CH A
1W01-902	1E06-3	OUT CABLF CH A
1W01-903	1E06-13	OUT CABLF CH A
1W01-904	1E06-16	OUT CABLF CH A
1W01-905	1E06-26	OUT CABLF CH A
1W01-906	1E12-18	OUT CABLF CH A
1W01-907	1E12-25	OUT CABLF CH A
1W02-90	1E07-24	INP CABLF CH A
1W02-91	1E07-26	INP CABLF CH A
1W02-92	1E07-28	INP CABLF CH A
1W02-93	1E07-3	INP CABLF CH A
1W02-94	1E07-5	INP CABLF CH A
1W02-95	1E07-7	INP CABLF CH A
1W02-96	1E08-24	INP CABLF CH A
1W02-97	1E08-26	INP CABLF CH A
1W02-98	1E08-28	INP CABLF CH A
1W02-99	1E08-3	INP CABLF CH A
1W02-900	1E08-5	INP CABLF CH A
1W02-901	1E08-7	INP CABLF CH A
1W02-902	1E09-7	INP CABLF CH A
1W02-903	1E09-5	INP CABLF CH A
1W02-904	1E09-3	INP CABLF CH A
1W02-905	1E09-28	INP CABLF CH A
1W02-906	1E02-12	INP CABLF CH A
1W02-907	1E09-8	INP CABLF CH A
1W03-90	1E03-28	PASSON CH. A
1W03-91	1E03-14	PASSON CH. A
1W03-92	1E03-15	PASSON CH. A
1W03-93	1E03-1	PASSON CH. A
1W03-94	1E04-28	PASSON CH. A
1W03-95	1E04-14	PASSON CH. A
1W03-96	1E04-15	PASSON CH. A
1W03-97	1E04-1	PASSON CH. A
1W03-98	1E05-28	PASSON CH. A
1W03-99	1E05-14	PASSON CH. A
1W03-900	1E05-15	PASSON CH. A
1W03-901	1E05-1	PASSON CH. A
1W03-902	1E06-1	PASSON CH. A
1W03-903	1E06-15	PASSON CH. A
1W03-904	1E06-14	PASSON CH. A
1W03-905	1E06-29	PASSON CH. A
1W03-906	1E12-17	PASSON CH. A
1W03-907	1E12-19	PASSON CH. A
1W04-90	1E07-8	PASSON(IN) CH A
1W04-91	1E07-9	PASSON(IN) CH A
1W04-92	1E07-10	PASSON(IN) CH A
1W04-93	1E07-21	PASSON(IN) CH A
1W04-94	1E07-22	PASSON(IN) CH A
1W04-95	1E07-23	PASSON(IN) CH A
1W04-96	1E08-8	PASSON(IN) CH A
1W04-97	1E08-9	PASSON(IN) CH A
1W04-98	1E08-10	PASSON(IN) CH A

1W04-99	1E08-21	PASSON(IN) CH A
1W04-900	1E08-22	PASSON(IN) CH A
1W04-901	1E08-23	PASSON(IN) CH A
1W04-902	1E09-23	PASSON(IN) CH A
1W04-903	1E09-22	PASSON(IN) CH A
1W04-904	1E09-21	PASSON(IN) CH A
1W04-905	1E09-10	PASSON(IN) CH A
1W04-906	1E09-26	PASSON(IN) CH A
1W04-907	1E09-24	PASSON(IN) CH A
1W05-90	1U03-26	OUT CABLF CH B <i>white/black</i>
1W05-91	1U03-16	OUT CABLF CH B <i>white/brown</i>
1W05-92	0-1U03-13	OUT CABLF CH B <i>WHITE/RED</i>
1W05-93	0-1U03-3	OUT CABLF CH B <i>WHITE/BRN</i>
1W05-94	0-1U04-26	OUT CABLF CH B <i>WHITE/YELLOW</i>
1W05-95	0-1U04-16	OUT CABLF CH B <i>WHITE/GREEN</i>
1W05-96	0-1U04-13	OUT CABLF CH B <i>WHITE/BLUE</i>
1W05-97	0-1U04-3	OUT CABLF CH B <i>WHITE/PURPLE</i>
1W05-98	0-1U05-26	OUT CABLF CH B <i>WHITE/GRY</i>
1W05-99	0-1U05-16	OUT CABLF CH B <i>WHITE</i>
1W05-900	1U05-13	OUT CABLF CH B <i>BLACK/BLACK</i>
1W05-901	1U05-3	OUT CABLF CH B <i>BLACK/BROWN</i>
1W05-902	1U06-3	OUT CABLF CH B <i>BLACK/RED</i>
1W05-903	1U06-13	OUT CABLF CH B <i>BLACK/BRN</i>
1W05-904	1U06-16	OUT CABLF CH B <i>BLACK/YELLOW</i>
1W05-905	1U06-26	OUT CABLF CH B <i>BLACK/GREEN</i>
1W05-906	1U12-18	OUT CABLF CH B <i>Blue/Black</i>
1W05-907	1U12-25	OUT CABLF CH B <i>PURPLE/PURPLE</i>
1W06-90	1U07-24	INP CABLF CH B
1W06-91	1U07-26	INP CABLF CH B
1W06-92	1U07-28	INP CABLF CH B
1W06-93	1U07-3	INP CABLF CH B
1W06-94	1U07-5	INP CABLF CH B
1W06-95	1U07-7	INP CABLF CH B
1W06-96	1U08-24	INP CABLF CH B
1W06-97	1U08-26	INP CABLF CH B
1W06-98	1U08-28	INP CABLF CH B
1W06-99	1U08-3	INP CABLF CH B
1W06-900	1U08-5	INP CABLF CH B
1W06-901	1U08-7	INP CABLF CH B
1W06-902	1U09-7	INP CABLF CH B
1W06-903	1U09-5	INP CABLF CH B
1W06-904	1U09-3	INP CABLF CH B
1W06-905	1U09-28	INP CABLF CH B
1W06-906	1U02-12	INP CABLF CH B
1W06-907	1U09-8	INP CABLF CH B
1W07-90	1U03-28	PASSON CH. A
1W07-91	1U03-14	PASSON CH. A
1W07-92	1U03-15	PASSON CH. A
1W07-93	1U03-1	PASSON CH. A
1W07-94	1U04-28	PASSON CH. A
1W07-95	1U04-14	PASSON CH. A
1W07-96	1U04-15	PASSON CH. A
1W07-97	1U04-1	PASSON CH. A
1W07-98	1U05-28	PASSON CH. A
1W07-99	1U05-14	PASSON CH. A
1W07-900	1U05-15	PASSON CH. A
1W07-901	1U05-1	PASSON CH. A
1W07-902	1U06-1	PASSON CH. A
1W07-903	1U06-15	PASSON CH. A
1W07-904	1U06-14	PASSON CH. A
1W07-905	1U06-28	PASSON CH. A
1W07-906	1U12-17	PASSON CH. A

1W07-907	1U12-14	PASSON CH. A
1W08-90	1U07-8	PASSON(IN) CH H
1W08-91	1U07-9	PASSON(IN) CH H
1W08-92	1U07-10	PASSON(IN) CH H
1W08-93	1U07-21	PASSON(IN) CH H
1W08-94	1U07-22	PASSON(IN) CH H
1W08-95	1U07-23	PASSON(IN) CH H
1W08-96	1U08-8	PASSON(IN) CH H
1W08-97	1U08-9	PASSON(IN) CH H
1W08-98	1U08-10	PASSON(IN) CH H
1W08-99	1U08-21	PASSON(IN) CH H
1W09-900	1U08-22	PASSON(IN) CH H
1W09-901	1U08-23	PASSON(IN) CH H
1W09-902	1U09-23	PASSON(IN) CH H
1W09-903	1U09-22	PASSON(IN) CH H
1W09-904	1U09-21	PASSON(IN) CH H
1W09-905	1U09-10	PASSON(IN) CH H
1W09-906	1U09-26	PASSON(IN) CH H
1W09-907	1U09-24	PASSON(IN) CH H
1W09-908	1C08-25	COMM OUT CARLE
1W09-909	1C08-6	COMM OUT CARLE
1W09-910	1C08-23	COMM OUT CARLE
1W09-911	1C08-8	COMM OUT CARLE
1W09-912	1C08-21	COMM OUT CARLE
1W09-913	1C08-10	COMM OUT CARLE
1W09-914	1C08-19	COMM OUT CARLE
1W09-915	1C08-12	COMM OUT CARLE
1W09-916	1C09-27	COMM OUT CARLE
1W09-917	1C09-4	COMM OUT CARLE
1W09-918	1C09-25	COMM OUT CARLE
1W09-919	1C09-6	COMM OUT CARLE
1W09-920	1C09-12	COMM OUT CARLE
1W09-921	1C09-19	COMM OUT CARLE
1W09-922	1C09-10	COMM OUT CARLE
1W09-923	1C09-21	COMM OUT CARLE
1W09-924	1C09-8	COMM OUT CARLE
1W09-925	1C09-23	COMM OUT CARLE
1W10-90	1C10-28	COMM INP CARLE
1W10-91	1C10-20	COMM INP CARLE
1W10-92	1C10-18	COMM INP CARLE
1W10-93	1C10-4	COMM INP CARLE
1W10-94	1C10-5	COMM INP CARLE
1W10-95	1C10-8	COMM INP CARLE
1W10-96	1C11-28	COMM INP CARLE
1W10-97	1C11-20	COMM INP CARLE
1W10-98	1C11-18	COMM INP CARLE
1W10-99	1C11-4	COMM INP CARLE
1W11-900	1C11-5	COMM INP CARLE
1W11-901	1C11-8	COMM INP CARLE
1W11-902	1C12-8	COMM INP CARLE
1W11-903	1C12-5	COMM INP CARLE
1W11-904	1C12-4	COMM INP CARLE
1W11-905	1C12-18	COMM INP CARLE
1W11-906	1E12-2	COMM INP CARLE
1W11-907	1U12-2	COMM INP CARLE
1W11-908	1U03-26	OUT CABLF CH C
1W11-909	1U03-16	OUT CABLF CH C
1W11-910	1U03-13	OUT CABLF CH C
1W11-911	1U03-3	OUT CABLF CH C
1W11-912	1U04-26	OUT CABLF CH C
1W11-913	1U04-16	OUT CABLF CH C
1W11-914	1U04-14	OUT CABLF CH C
1W11-915	1U04-15	OUT CABLF CH C
1W11-916	1U04-1	OUT CABLF CH C

1411-97	1804-3	OUT CABLF CH C	1414-94	1807-22	PASSON(IN)CH C	1417-96	1A04-15	PASSON CH. D
1411-98	1805-26	OUT CABLF CH C	1414-95	1807-23	PASSON(IN)CH C	1417-97	1A04-1	PASSON CH. D
1411-99	1805-16	OUT CABLF CH C	1414-96	1808-8	PASSON(IN)CH C	1417-98	1A05-2H	PASSON CH. D
1411-900	1805-13	OUT CABLF CH C	1414-97	1808-9	PASSON(IN)CH C	1417-99	1A05-14	PASSON CH. D
1411-901	1805-3	OUT CABLF CH C	1414-98	1808-10	PASSON(IN)CH C	1417-900	1A05-15	PASSON CH. D
1411-902	1806-3	OUT CABLF CH C	1414-99	1808-21	PASSON(IN)CH C	1417-901	1A05-1	PASSON CH. D
1411-903	1806-13	OUT CABLF CH C	1414-900	1808-22	PASSON(IN)CH C	1417-902	1A06-1	PASSON CH. D
1411-904	1806-16	OUT CABLF CH C	1414-901	1808-23	PASSON(IN)CH C	1417-903	1A06-15	PASSON CH. D
1411-905	1806-26	OUT CABLF CH C	1414-902	1809-23	PASSON(IN)CH C	1417-904	1A06-14	PASSON CH. D
1411-906	1E12-11	OUT CABLF CH C	1414-903	1809-22	PASSON(IN)CH C	1417-905	1A06-2H	PASSON CH. D
1411-907	1012-11	OUT CABLF CH C	1414-904	1809-21	PASSON(IN)CH C	1417-906	1A12-17	
1412-90	1807-24	INP CABLF CH C	1414-905	1809-10	PASSON(IN)CH C	1417-907	1A12-14	
1412-91	1807-26	INP CABLF CH C	1414-906	1809-26	PASSON(IN)CH C	1417-908	1A07-8	PASSON(IN)CH D
1412-92	1807-28	INP CABLF CH C	1414-907	1809-24	PASSON(IN)CH C	1417-909	1A07-4	PASSON(IN)CH D
1412-93	1807-3	INP CABLF CH C	1415-90	1A03-26	OUT CABLF CH D	1417-910	1A07-10	PASSON(IN)CH D
1412-94	1807-5	INP CABLF CH C	1415-91	1A03-16	OUT CABLF CH D	1417-911	1A07-21	PASSON(IN)CH D
1412-95	1807-7	INP CABLF CH C	1415-92	1A03-13	OUT CABLF CH D	1417-912	1A07-22	PASSON(IN)CH D
1412-96	1808-24	INP CABLF CH C	1415-93	1A03-3	OUT CABLF CH D	1417-913	1A07-23	PASSON(IN)CH D
1412-97	1808-26	INP CABLF CH C	1415-94	1A04-26	OUT CABLF CH D	1417-914	1A08-8	PASSON(IN)CH D
1412-98	1808-28	INP CABLF CH C	1415-95	1A04-16	OUT CABLF CH D	1417-915	1A08-4	PASSON(IN)CH D
1412-99	1808-3	INP CABLF CH C	1415-96	1A04-13	OUT CABLF CH D	1417-916	1A08-10	PASSON(IN)CH D
1412-900	1808-5	INP CABLF CH C	1415-97	1A04-3	OUT CABLF CH D	1417-917	1A08-21	PASSON(IN)CH D
1412-901	1808-7	INP CABLF CH C	1415-98	1A05-26	OUT CABLF CH D	1417-918	1A08-22	PASSON(IN)CH D
1412-902	1809-7	INP CABLF CH C	1415-99	1A05-16	OUT CABLF CH D	1417-919	1A08-23	PASSON(IN)CH D
1412-903	1809-5	INP CABLF CH C	1415-900	1A05-13	OUT CABLF CH D	1417-920	1A09-23	PASSON(IN)CH D
1412-904	1809-3	INP CABLF CH C	1415-901	1A05-3	OUT CABLF CH D	1417-921	1A09-22	PASSON(IN)CH D
1412-905	1809-28	INP CABLF CH C	1415-902	1A06-3	OUT CABLF CH D	1417-922	1A09-21	PASSON(IN)CH D
1412-906	1809-12	INP CABLF CH C	1415-903	1A06-13	OUT CABLF CH D	1417-923	1A09-10	PASSON(IN)CH D
1412-907	1809-8	INP CABLF CH C	1415-904	1A06-16	OUT CABLF CH D	1417-924	1A09-26	
1413-90	1803-28	PASSON CH. C	1415-905	1A06-26	OUT CABLF CH D	1417-925	1A09-24	
1413-91	1803-14	PASSON CH. C	1415-906	1A12-18		1417-926	1013-26	CABLE CONN
1413-92	1803-15	PASSON CH. C	1415-907	1A12-25		1417-927	1016-2	SWITCH MODULE
1413-93	1803-1	PASSON CH. C	1416-90	1A07-24	INP CABLF CH D	1417-928	1013-23	CABLE CONN
1413-94	1804-28	PASSON CH. C	1416-91	1A07-26	INP CABLF CH D	1417-929	1016-10	SWITCH MODULE
1413-95	1804-14	PASSON CH. C	1416-92	1A07-28	INP CABLF CH D	1417-930	1013-14	CABLE CONN
1413-96	1804-15	PASSON CH. C	1416-93	1A07-3	INP CABLF CH D	1417-931	1016-18	SWITCH MODULE
1413-97	1804-1	PASSON CH. C	1416-94	1A07-5	INP CABLF CH D	1417-932	1013-1	CABLE CONN
1413-98	1805-28	PASSON CH. C	1416-95	1A07-7	INP CABLF CH D	1417-933	1013-4	CABLE CONN
1413-99	1805-14	PASSON CH. C	1416-96	1A08-24	INP CABLF CH D	1417-934	1013-5	CABLE CONN
1413-900	1805-15	PASSON CH. C	1416-97	1A08-26	INP CABLF CH D	1417-935	1013-22	CABLE CONN
1413-901	1805-1	PASSON CH. C	1416-98	1A08-28	INP CABLF CH D	1417-936	1E16-2	SWITCH MODULE
1413-902	1806-1	PASSON CH. C	1416-99	1A08-3	INP CABLF CH D	1417-937	1013-10	CABLE CONN
1413-903	1806-15	PASSON CH. C	1416-900	1A08-5	INP CABLF CH D	1417-938	1E16-6	SWITCH MODULE
1413-904	1806-14	PASSON CH. C	1416-901	1A08-7	INP CABLF CH D	1417-939	1013-27	CABLE CONN
1413-905	1806-28	PASSON CH. C	1416-902	1A09-7	INP CABLF CH D	1417-940	1E16-10	SWITCH MODULE
1413-906	1E12-5	PASSON CH. C	1416-903	1A09-5	INP CABLF CH D	1417-941	1A13-22	CABLE CONN
1413-907	1012-5	PASSON CH. C	1416-904	1A09-3	INP CABLF CH D	1417-942	1016-26	SWITCH MODULE
1414-90	1807-8	PASSON(IN)CH C	1416-905	1A09-28	INP CABLF CH D	1417-943	1A13-1	CABLE CONN
1414-91	1807-9	PASSON(IN)CH C	1416-906	1A02-12	INP CABLF CH D	1417-944	1A13-19	CABLE CONN
1414-92	1807-10	PASSON(IN)CH C	1416-907	1A09-8	INP CABLF CH D	1417-945	1E16-14	SWITCH MODULE
1414-93	1807-21	PASSON(IN)CH C	1417-90	1A03-28	PASSON CH. D	1417-946	0H0	CABLE CONN
			1417-91	1A03-14	PASSON CH. D			
			1417-92	1A03-15	PASSON CH. D			
			1417-93	1A03-1	PASSON CH. D			
			1417-94	1A04-2H	PASSON CH. D			
			1417-95	1A04-14	PASSON CH. D			

SECTION 5

PARTS DATA

MAINTENANCE PARTS DATA

The parts listed here are considered normal replacement items. Standard cabinet parts that seldom require replacement are cross-referenced at the fabrication facility according to QSE number.

Publications which detail the parts lists for printed circuit card assemblies, peripheral cabinets, and power supplies are cross-referenced in the Corporate Literature Distribution Center Catalog.

Multiple Access Controller

PARTS LIST
CHASSIS ASSEMBLY

CDC - DRAWING NUMBER	DESCRIPTION	QUANTITY EACH MACHINE
18164200	Capacitor, Fixed, Electrolytic, 300 VF, 10v	
24512001	Connector, Receptacle, 24 Socket	
24518102	Connector, Flexible Conduit, used with 1/2 in. cable	
24562500	Connector, Receptacle, 30 Socket	

COMMENT SHEET

CDC FR103-A / FR104-A / FR105-A / FV146-A Multiple
MANUAL TITLE: Access Controller Equipment Hardware Reference /
Customer Engineering Manual

PUBLICATION NO.: 44619400

REVISION: F

NAME: _____

COMPANY: _____

STREET ADDRESS: _____

CITY: _____ **STATE:** _____ **ZIP CODE:** _____

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